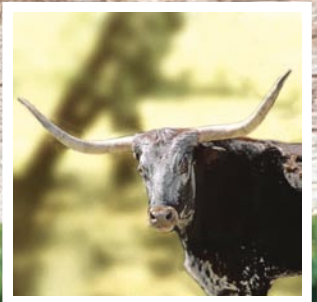


Oral Health in Texas



**Department of
State Health Services
Oral Health Program**

2007



Oral Health In Texas

I.	EXECUTIVE SUMMARY	3
II.	INTRODUCTION	5
III.	NATIONAL AND STATE OBJECTIVES ON ORAL HEALTH.....	9
	Demographics	15
	Access to Care.....	20
IV.	THE BURDEN OF ORAL DISEASES.....	24
a.	Prevalence of Disease and Unmet Needs.....	24
i.	Children	24
ii.	Adults.....	29
b.	Disparities	39
i.	Racial and Ethnic Groups	39
ii.	Women’s Health	39
iii.	People with Disabilities	41
	Birth Defects: Cleft Lip and Palate.....	42
iv.	Socioeconomic Disparities	44
c.	Societal Impact of Oral Disease.....	45
i.	Social Impact	45
ii.	Economic Impact	46
iii.	Oral Disease and Other Health Conditions.....	47
V.	RISK AND PROTECTIVE FACTORS AFFECTING ORAL DISEASES.....	48
a.	Community Water Fluoridation	48
b.	Topical Fluorides and Fluoride Supplements	51
c.	Dental Sealants.....	52
d.	Preventive Visits	61
e.	Cleanings.....	62
g.	Tobacco Control.....	65
h.	Oral Health Education.....	69
i.	Oral Health Coalitions	70
VI.	PROVISION OF DENTAL SERVICES	72
	Dentists	72
	Health Professional Shortage Areas (HPSA).....	75
	Use of Dental Services.....	80
	Special Populations	82
	Children’s Health Insurance Program (CHIP).....	88
	Community and Migrant Health Centers and other State, County, and Local Programs	89
VII.	CONCLUSIONS.....	91
VIII.	REFERENCES	94
	Appendix a. Indicators of Oral Health Status.....	105
	Appendices: a & b.....	105
	Appendix b. Data Release Calendar and Data Source Guide for Oral Health Indicators.....	106
VIII.	ACKNOWLEDGMENTS	111

I. EXECUTIVE SUMMARY

Oral Health in Texas represents the most complete source of information regarding the oral health status of Texans. The burden document presents a “snapshot” of oral health and the distribution of oral health problems among Texas residents, based on the most current data available. The descriptions of oral health problems, their causes and possible solutions are based on data from national, state and community level surveys. These data sources represent the Texas Oral Health Surveillance System. The Oral Health Program (OHP) at the Texas Department of State Health Services (DSHS) gathers combines and analyses the information about oral health behavior and trends from this system. Results and implications of the activities of the OHP direct and drive the oral health programs and services provided by DSHS and its many partners. OHP efforts are expanding as public awareness of the impact of oral diseases on the quality of life is increasing.

Public awareness of oral health has increased as a result of the release of three important documents: Oral Health in America: A Report of the Surgeon General (2000), A National Call to Action to Promote Oral Health (2003), and Office of the Inspector General Report: Children’s Dental Services Under Medicaid – Access and Utilization (1996) . These reports show that prevention, early detection and treatment of oral diseases can greatly improve the overall health of children and adults. Oral health problems are mostly preventable, but prevention requires access to health care and identification of the health needs of a population as early as possible.

The Healthy People 2010 (HP 2010) objectives provide the primary context in which this document is written. The Centers for Disease Control and Prevention (CDC) established HP 2010 Oral Health objectives as benchmarks of oral health for all states and territories. Therefore, a goal of this report is to provide data that have been collected within the last five (5) years and to chronicle the efforts of the State as it strives to achieve these goals.

- Statewide data as of August 2006 indicate that Texas is making progress toward meeting HP 2010 targets for children and adolescents for preventive care, dental sealants and prevalence of tooth decay.
- Texas is also making strides in reducing the incidence of oral cancer. Oral cancer represents about 2.4% of the cancer cases diagnosed annually and is attributed to 1.5% of the cancer related deaths.
- Tooth extractions have decreased in prevalence in Texas. Between 1999 and 2004, extractions decreased from 47.3% to 35.5% among adults and children/adolescents.
- The oral health of older adults has improved in Texas. IN 2000, only 17% of Texans over 65 were edentate (OHP DSHS, 2003).
- Seventy-six (76) percent of the Texas population presently benefits from drinking water containing optimal/beneficial levels of natural or adjusted fluoride (between 0.8 and 1.2 mg/liter) (DSHS Fluoridation Program 2002).
- Twenty-two (22) percent of Texas general dentists are Medicaid dental providers.

- Seventeen (17) percent of Texas counties (44) do not have a practicing dentist.
- Forty-two (42) percent of Texas counties (107) have a shortage of dental providers.
- The Texas Oral Health Coalition (TxOHC) was established in 2005.
- The Collaborative Oral Health Plan in Texas was published in 2005.
- Statewide Annual Oral Health Summits have been held since 2004.

In summary, this edition of Oral Health in Texas has three purposes. Primarily, the intention is to update readers on the progress that Texas has made in meeting the challenges suggested by HP 2010. Secondly, the report represents a discussion of the burden of oral disease and the implication for socioeconomic resources and services in Texas, based on current data and recent trends. Data on recent and historical changes and a discussion of the factors affection such changes are discussed when appropriate.

Each section attempts to give a description for a particular oral health topic in terms of past trends, current estimate, future projections and what these changes mean for individuals, providers and the State. Finally, an expanded discussion of policy implications is presented. Oral Health in Texas, therefore, serves as both a report card and a prognosis for the future.

II. INTRODUCTION

The mouth is our primary connection to the world. We eat, drink, and take in nutrients through our mouths. We use the mouth to speak and interact with other people. The mouth is the most visible sign of our moods and a main feature of our faces. The health of the mouth is directly related to overall health throughout the lifespan. You cannot have a healthy body without a healthy mouth.

An investment in oral health is much more than “just healthy teeth.” Oral health refers to the health of the entire mouth: the teeth, gums, hard and soft palate, linings of the mouth and throat, tongue, lips, salivary glands, chewing muscles, and upper and lower jaws. Oral health is not mutually exclusive of the health of the rest of the body. A growing body of research shows that infections in the mouth such as periodontal (gum) diseases can increase the risk of heart disease. These infections have been implicated in premature births. They can also complicate the control of blood sugar for people with diabetes. Changes in the mouth often serve as the first indications of problems elsewhere in the body. For example, infectious diseases, immune disorders, nutritional deficiencies, and cancer may often first reveal themselves by changes in the mouth.

Not only does good oral health mean being free of tooth decay and gum disease, it also means being free of chronic oral pain conditions, oral cancer, birth defects such as cleft lip and palate, and other conditions that affect the mouth and throat.

Good oral health includes the ability to carry on the most basic human functions such as chewing and swallowing. Good oral health also includes the capacity to perform basic interpersonal communication through speaking, smiling, kissing, and singing. The health of the mouth can affect every aspect of the human experience. The impact that poor oral health can have on a person’s physical, mental, economic, and social health establishes it as an important target for public health concern. Good health means good oral health.

The following overview is the most comprehensive study to date of the oral health status of Texas residents. It contains the most currently available information on the oral disease burden in Texas. Populations of people who are at the highest risk for oral health problems are identified. Additionally, strategies to prevent poor oral health and to improve access to dental care are discussed. When possible, comparisons to the national data regarding the prevalence and incidence rates of oral health problems and oral risk behaviors are made. When appropriate, comparisons are made to the prevalence and incidence rates as outlined by the *HP 2010* goals. For some conditions, only national data were available at the time this report was prepared.

Public Health in Texas

The way public health programs operate in Texas is unique for several reasons. Texas is big. Texas covers a large land area, 267,277 square miles, with a very diverse topography. It is the largest of the contiguous states, with beaches to the south, mountains to the east, and deserts, hills, forests, and prairies scattered throughout. Nearly 23 million people live in Texas. There are many heavily populated urban areas: Dallas, Houston, and San Antonio are among the nation's 10 largest cities. However, there are many sparsely populated and rural areas as well.

Texas borders Louisiana, Arkansas, Oklahoma, and New Mexico. Mexico, which has many of its own economic and health challenges, borders Texas to the south. Texas is many times the first stop for immigrants from Central and South America. Texas has retained its multicultural flavor and remains a very international and diverse place to live.

The health of a state is directly related to the economic picture. Texas' very diversified economy, with booming oil, medical, technological, and manufacturing industries, has sustained periods of growth when the national economy was depressed. The financial opportunities Texas offers have attracted people throughout the nation and the world. While many Texans enjoy considerable prosperity and ready access to health care, many other residents suffer economic despair and often have no access to basic health services. In fact, 68 of the 254 State's counties had some of the highest county-level poverty rates in the nation (Murdock et al, 2002).

Expanding access to oral and dental care remains a challenge to prevention efforts. However, service delivery exists within the context of increased urban migration, immigration, and polarization of wealth spread across a very wide and vast area of land. The physical distance to dental care facilities/professionals means that many people who reside in the remote areas of Texas face challenges in accessing oral health care. The decreasing numbers of practicing dentists, and limited dental specialists, especially in the semi-rural and rural areas of the state, put residents at greater risk for poor oral health.

Differences in language, cultural norms, and expectations shape health provider/patient interaction, communication, and understanding of symptoms, diagnosis, and treatment. Limited dental and financial resources available to economically challenged individuals and families of all ages and backgrounds mean that these individuals will have poorer oral and general health outcomes. Children in resource poor conditions are at the greatest risk. Children with poor oral health are likely to become adults with poor oral health.

Oral Health in Texas

The impact of demographic and socioeconomic change is discussed as the underlying basis for change in the demand for public and private sector oral health services in Texas. A series of sections look at the implications of population demographics and socioeconomic characteristics for key public or selected privately provided oral and dental health services. Each of these topical sections examines recent and historical changes in the oral health topics under consideration, including current service demand and provision, provides an overview of the projected changes in the service area, and examines the implications of the projected changes. The document concludes with a chapter that assesses the disparities that exist in oral health and the implications of the past and projected changes for the future oral health of Texans.

Oral health problems are located in a complex causal web. The causes and effects of oral health and the burden of oral disease are sometimes difficult to disentangle from its personal and social repercussions. Economics, policies, societal, and other factors may affect health outcomes much more than demographics. The lack of understanding of the relationship between untreated oral disease and the overall health of individuals contributes to the oral health status of Texans. The need to initiate preventive dental services in children at one year of age or earlier is not well understood.

In examining the implications of population characteristics for oral health topics, an attempt was made to include the most important areas of oral health concerns in the State. However, time, data availability, and space may have prohibited the inclusion of many other equally important issues. The data used in this document are based on values that are either directly or indirectly derived from historical population, socioeconomic and oral disease and health behavior statistics, and projections of population-based factors affecting the topics under examination, as they relate to oral health. This model was developed by the Office of the State Demographer in its analysis of population shifts on public services (Murdock et al., 2002).

The discussion of oral health disparities focuses on racial/ethnic or gender differences and the impact of these differences on oral health conditions and service delivery. This discussion takes place while recognizing that race/ethnicity, or gender as social/cultural, or other phenomena alone are not determinants of oral health or socioeconomic factors status (Murdock et al., 2002). The interplay of race/ethnicity with historical discriminatory practices and other factors, many socioeconomic conditions, and other differences reveals itself in the oral health status of populations and the services they receive. Many oral health disparities that have been associated with race or ethnicity may in fact be due to differences in social class (Murdock et al., 2002). Race/ethnicity (and many times gender) can be used as indicators of socioeconomic differences in oral health.

Race/ethnicity and gender-related forms of discrimination still impact peoples' lives. When appropriate and when data permit, oral health topics are analyzed by socioeconomic or social class. When these data are not appropriate or available, race/ethnicity and gender are used in the analysis of disparities in oral health and the burden of oral disease among Texans (Murdock et al., 2002). However, the overarching point is that race/ethnicity and sex do not explain "it all."

In the discussion of race/ethnicity, and culture or other discussions of demography, there was an attempt to remain consistent in the terminology and to source materials. However, the standardization of the terminology was a difficult task as several data sources contribute to the discussion of population shifts, and epidemiological analyses. In addition, there is no agreement from civil rights or advocacy groups, federal policies or state guidelines regarding a uniform term (Murdock et al., 2002). As the Office of the State Demographer suggests, the comparisons between data sources are difficult due to the variability in response categories for race/ethnic identification (Murdock et al., 2002). For example, the 2000 Census allowed for the "Multiple-race" identification; however, it is not clear if this category includes the "Other" racial/ethnic response category of previous surveys. Time and resources restricted comprehensive discussion of oral health for all possible combinations racial/ethnic groups, age range or gender specific issues. However, oral health conditions that were found to be particularly prevalent among certain population groups were discussed.

This document raises public awareness, supports ongoing surveillance efforts, guides oral disease prevention and intervention efforts related to oral health. Dental professionals and policy makers can use this document and the lessons learned to help enhance the quality of care for Texas' residents.

III. NATIONAL AND STATE OBJECTIVES ON ORAL HEALTH

The U.S. Surgeon General's (2000) Report on Oral Health was a "wake-up call" to policy makers, civic leaders, private industry, health professionals, the media, and the public. The message was that oral health is essential to the health and well being of the population. The report found a lack of public awareness about the importance of oral health. In addition, the report highlighted the economic and racial disparities that exist. Specifically, the report showed that disadvantaged and minority children are at the greatest risk for severe medical complications because of poor or non-existent oral health care.

Oral Health in America: A Report of the Surgeon General (the Report) alerted Americans to the importance of oral health in their daily lives (USDHHS, 2000a). The report was issued in May 2000 with the intention of motivating policy makers, community leaders, private industry, health professionals, the media, and the public to affirm that:

"No one should suffer from oral diseases or conditions that can be effectively prevented and treated. No schoolchild should suffer the stigma of craniofacial birth defects nor be found unable to concentrate because of the pain of untreated oral infections. No rural inhabitant, no homebound adult, no inner city dweller should experience poor oral health because of barriers to access to care and shortages of resources and personnel."

-U.S. Surgeon General 2000

The Report serves as a guide to oral health promotion, oral disease prevention and management, and to what needs and opportunities exist to enhance oral health. The document discussed several barriers that hinder the ability of some Americans to attain optimal oral health. The Surgeon General noted that despite the number of technological advancements that have been made in the detection and treatment of oral health related diseases, health disparities persist and access to oral health care remains problematic for some subpopulations.

The Surgeon General's Report concluded with a framework for action, calling for a national oral health plan to improve quality of life and eliminate oral health disparities. To overcome existing barriers, the Surgeon General called for the evaluation and replication of best practices in oral health. The development of collaborative partnerships between government, private entities, and other stakeholders was also recommended as a strategy for reducing oral health disparities. The Surgeon General's plan seeks to expand oral health efforts by enlisting the expertise of individuals, health care providers, communities, and policy makers at all levels of society.

Five action areas were identified in the Report:

- Change perceptions of oral health care;
- Overcome barriers to care by replicating effective programs and proven efforts;

- Build the science base and accelerate science transfer;
- Increase oral health workforce diversity, capacity and flexibility; and
- Increase collaborations.

The *Report's* message was that oral health is essential to general health and well-being and that good oral health can be achieved. Improving oral health cannot be accomplished by any single agency. A successful execution of a comprehensive oral health plan calls for partnerships that unite private and public groups focused on common goals.

As a result of the issuance of this report, a broad coalition of public and private organizations and individuals collaborated in the preparation of the National Call to Action to Promote Oral Health (USDHHS, 2003). The goal of the *Call to Action* was “To advance the general health and well-being of all Americans by creating critical partnerships at all levels of society to engage in programs to promote oral health and prevent disease.” Goals of the *Call to Action* are:

- To promote oral health;
- To improve quality of life; and
- To eliminate oral health disparities.

These goals are an extension of the set of national indicators developed in *HP 2010* oral health objectives released in November 2000. *HP 2010* presents a comprehensive, nationwide health promotion and disease prevention agenda (USDHHS, 2000b), and serves as the roadmap for improving the health of all people in the United States during the first decade of the 21st century. Included are objectives for key structures, processes, and outcomes related to improving oral health. These objectives represent the ideas and expertise of a diverse range of individuals and organizations concerned about the nation's oral health.

National objectives for oral health such as those in *HP 2010* provide measurable targets for the nation, but most core public health functions of assessment, assurance, and policy development occur at the state level. The entity responsible for these public health functions in Texas is the Department of State Health Services' (DSHS) Oral Health Program (OHP).

The *Call to Action* is an appeal for the development of plans at the state and community levels, with attention to planning, evaluation, and accountability (USDHHS, 2003). DSHS OHP has responded by participating in the development of a collaborative oral health plan, development of the Texas Oral Health Coalition, development of an oral health surveillance system, and by developing a comprehensive evaluation plan. This process is data-driven. Data collected during this on-going process will be used to determine program effectiveness, plan future activities, and make programmatic decisions.

Achieving *HP 2010* objectives necessitates creative, new, and collaborative approaches. Success involves approaches that are supported by the grassroots and have scientific rationale. DSHS will continue to rely on multiple strategies to evaluate and document the State program accomplishments. The evaluation plan will rely on a set of measurable and achievable objectives on key indicators of the oral disease burden, oral health promotion, and oral disease prevention. Where possible, OHP data that are relevant to *HP 2010* oral health indicators are presented in this report. (See complete list of *HP 2010* oral health indicators in Appendix A).

Oral health status trends in the United States vary with socio-demographic factors. Hardest hit are low-income and minority children. Research has shown that families with low incomes were five times more likely to have untreated tooth decay than their peers from families with higher incomes. According to the Surgeon General's report on oral health, tooth decay is the single most common chronic childhood disease, five times more common than asthma. Current studies have documented an association between poor maternal oral health and the risk of pre-term birth and low birth weight infants, as well as early childhood caries among offspring.

According to the Centers for Disease Control and Prevention (CDC), in examining the effectiveness of school-based or school-linked dental sealant programs, there was typically a 60% decrease in new decay for up to two to five years after a single application. An estimated 51 million school hours are lost annually across the nation due to dental-related illness. Healthy People 2010 recommend an increase in the proportion of children who have received dental sealants on their molar teeth to 50%.

Priorities of the DSHS OHP include, identifying areas of the state in greatest need and utilizing regional staff to provide preventive dental services to a target population. Through August 2006, dental screenings were provided to 18,442 school children and 5,865 (32%) were provided dental sealants. Screenings were also done on 3,092 Head Start students and 3,073 (99%) were provided with fluoride varnish.

In addition, the DSHS OHP recognizes the necessity of a surveillance system to monitor Texans' oral health status. Another priority of the DSHS OHP is the establishment and implementation of scientifically based protocols and methodologies to obtain data on the oral health status of Texans in order to most appropriately affect policy and the provision of services.

In light of the disparities that exist in oral health, another priority of the Texas DSHS OHP is to focus resources on efforts to address the expansion of the dental workforce through increased infrastructure and partnering opportunities and increased utilization of dental services in areas of the state where access is less of an issue, yet utilization remains low.

Eighty-three percent of Texas counties have demonstrated low dental service utilization. *HP 2010* has two objectives that address the need for an increase in school-based health centers with an oral health component, as well as local health departments,

community-based health centers, community migrant and homeless health centers that have an oral health component. Medicaid dental providers account for only 22.5% (n=1,740) of the dental-generalist workforce in Texas. Seventeen percent (n=44) of Texas counties do not have a practicing dentist, and 42% (n=107) of Texas counties have a shortage of dental healthcare providers.

A final objective of the OHP is to enhance efforts to increase the number of communities with optimal levels of fluoridation in their water supplies.

There are several communities throughout Texas that do not benefit from optimal levels of fluoride in their water supplies. *HP 2010* recommends an increase in the proportion of the population served by optimally fluoridated water. A CDC study has found that for communities with more than 20,000 residents, every \$1 invested in community water systems with fluoridation yields \$38 in savings from fewer cavities treated (CDC, 2006).

DSHS' OHP has implemented a surveillance system that allows the state to track and monitor the prevalence of dental caries among selected preschoolers (i.e., Head Start enrollees, birth - 5 years of age) and third graders. In August 2006, the Basic Screening Survey (BSS) was completed. The OHP is currently analyzing the data and will subsequently disseminate its findings to stakeholders.

The *HP 2010* oral health objectives for the nation and the status of each indicator for the United States and for Texas are summarized in Table 1(below). Specifically the table lists the selected *HP 2010* oral health targets for the nation, current oral health percentages for the U.S., and current percentages for Texas.

Texas is reaching or has surpassed several of the *HP 2010* objectives. For example, an *HP 2010* objective is the reduction of the oral cancer death rate to 2.7 per 100,000. In Texas, the oral cancer death rate for 2003 was 3.0 per 100,000. Access to fluoridated water systems is higher in Texas with 76% of the population having access while the national average is 62% (NOHSS, 2003). Table 1 shows the *HP 2010* targets, national averages and current status in Texas for the Oral Health indicators.

Table 1. Health People 2010 Oral Health Indicators (21-1 to 21-8), Target Levels, and Status: United States and Texas

Healthy People Objectives 2010 [Objective Number and Description]	Target (%)	US ^a (%)	Texas ⁱ (%)
21-1 Dental Caries Tooth Decay Experience			
a) Young children, 2–4 yrs	11	23	32
b) Children, 6–8 yrs	42	50	66
c) Adolescents, 15 yrs	51	59	68
21-2 Untreated caries (tooth decay)			
a) Young children, 2–4 yrs	9	20	33
b) Children, 6–8 yrs	21	26	40
c) Adolescents, 15 yrs	15	16	19
d) Adults, 35–44 yrs	15	26	35
21-3 Adults with no tooth loss, 35–44 yrs	42	39	39
21-4) Edentulous (toothless) older adults, 65–74 yrs	20	25b	20
21-5) Periodontal (gum) diseases, adults 35–44 yrs			
a) Gingivitis, 35–44 yrs	41	48c	41
b) Destructive periodontal (gum) diseases, 35–44 yrs	14	20	
3-6) Oral/pharyngeal cancer death rates reduction (per 100,000 population)	2.7	3.0d*	3
21-6) Oral/pharyngeal cancers detected at earliest stages, all	50	35e	41.2
21-7) Oral/pharyngeal cancer exam within past 12 mos, 40+ yrs	20	13d	
21-8) Dental sealants			
a) Children, aged 8 years (1st molars)	50	28	33.6
b) Adolescents (1st and 2nd molars) 14 years	50	14	

Table 1 Sources:

U.S. Department of Health and Human Services. *Healthy People 2010, Progress Review, 2000*.

Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls.

<These data will be updated in 2006.>

DNC = Data not collected *Age adjusted to the year 2000 standard population

^a Data are for 1999–2000, unless otherwise noted. ^b Data are for 2002.

^c Data are for 1988–1994. ^d Data are for 1998. ^e Data are for 1996–2000.

^f Data are for 2000. ^g Data are for 1997. ^h Data are for 1999.

ⁱ Texas Data Source(s) child/ adolescent -2005 Title V MCH National Performance Measure, adult populations- BRFSS 2003.

Note: Teeth cleaning data are required in the burden document. Teeth cleaning is a NOHSS indicator but is not included in *Healthy People 2010*. See Part V, Section D, “Preventive Visits,” in this document.

Texas has not reached the *HP 2010* target of 50% for the percentage of children who have received dental sealants on their molar teeth. Currently, 23% of Texas eight-year-olds have not received dental sealants on their molar teeth. Texas also has not obtained the *HP 2010* targeted proportions of long-term residents who use the oral health system each year, or the proportion of low-income children and adolescents who received any preventive dental service during the past year. Table 1a shows *HP 2010* targets and national and State status for dental sealants, fluoridation, and community capacity building activities.

Table 1a. Health People 2010 Oral Health Indicators (21-9 to 21-17) , Target Levels, and Status : United States and Texas

Healthy People Objectives 2010 [Objective Number and Description]	Target (%)	US ^a (%)	Texas ⁱ (%)
21-9) Population served by fluoridated water systems, all	75	68 ^b	76
21-10) Dental visit within past 12 months, children and adults	56	43 ^f	47
21-11) Use of oral health care system by adult residents in long-term care facilities	25	19 ^g	DNC
21-12) Low-income children and adolescents receiving preventive dental care during past 12 months, 0–18 years	57	31 ^f	38
21-13) School-based health centers with oral health component, K–12	--	DNC	DNA
a) Dental sealants			
b) Dental care			
21-14) Community-based health centers and local health departments with oral health components, all	75	61 ^b	In Development
21-15) System for recording and referring infants and children with cleft lip and cleft palate, all	51 (all) states & D.C.	23 states & D.C. ^g	In Development
21-16) Oral health surveillance system, all	51 (all) states & D.C.	0 states ^h	In Development
	--	DNC	
21-17) Tribal, state, and local dental programs with a public health trained director, all			
a) state and local			a) state
b) tribal and Indian Health Service			b) DNC

Table 1a Sources:

U.S. Department of Health and Human Services. *Healthy People 2010, Progress Review, 2000.*

Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls.

<These data will be updated in 2006.>

DNC = Data not collected *Age adjusted to the year 2000 standard population

^a Data are for 1999–2000, unless otherwise noted. ^b Data are for 2002.

^c Data are for 1988–1994. ^d Data are for 1998. ^e Data are for 1996–2000.

^f Data are for 2000. ^g Data are for 1997. ^h Data are for 1999.

ⁱ Texas Data Source(s) child/ adolescent -2005 Title V MCH National Performance Measure, adult populations- BRFSS 2003.

Note: Teeth cleaning data are required in the burden document. Teeth cleaning is a NOHSS indicator but is not included in *Healthy People 2010*. See Part V, Section D, “Preventive Visits,” in this document.

The oral health plan entitled, *Collaborative Oral Health Plan in Texas*, guides collaborations on specific actions for enhancing oral health and other state health initiatives. For a complete overview, the oral health plan can be accessed at: <http://dental.uthscsa.edu/oralhealthsummit>.

Several overarching points surround the strategies that are outlined in this plan. First, state and local systems should work collaboratively to make sustained improvements in oral health for children and adults in Texas. Multidisciplinary collaboration and coordination between systems including medical, dental, and mental health, social services, academia and education, non-profit, professional organization, and government at the state and local levels are essential for progress. Leadership at the

state and local levels is critical to advocate for quality assurance, policy changes, and enhanced human and financial resources throughout the oral health system.

STATE PROFILE

The following Texas state profile provides a context in which oral health issues must be addressed. Information such as the relative demography and social geography of the state are important considerations for any public health effort, including improving the overall oral health status for Texas.

The demographics of Texas have changed dramatically since its settlement over 150 years ago. By the beginning of the century, Texas had moved from being entirely rural and sparsely populated to being the second largest state in the United States with a population of nearly 23 million persons with three of the 10 largest cities in the nation (Murdock et al, 2002). The implications of such dramatic population shifts for the State have been in terms of its role in providing public services and ensuring the public welfare. The population shifts in Texas were like that of the nation in general. However, in many other ways Texas was different.

Texas borders four other states and Mexico, each with their own economic and health challenge. While many Texans enjoy considerable prosperity and ready access to health care, many other residents suffer economic despair and often have no access to basic health services.

Demographics

Race/Ethnicity

The racial/ethnic makeup of the Texas residents is diverse. African American, Asian, Hispanic, Native American, White, and many other people are represented in large proportions of the Texas population. Results from the Current Population Survey (CPS, 2006 Supplement) show that of the 22.8 million people who resided in Texas as of 2006:

- 10,911,299 were White.
- 8,329,564 were Hispanic.
 - Approximately 41% of the Hispanic peoples in Texas were born in Central America.
- 2,617,219 were African American.
- 961,404 were other/bi/multi racial/ethnic groups.

Figure 1 (below) illustrates the racial/ethnic proportions of the States demography.

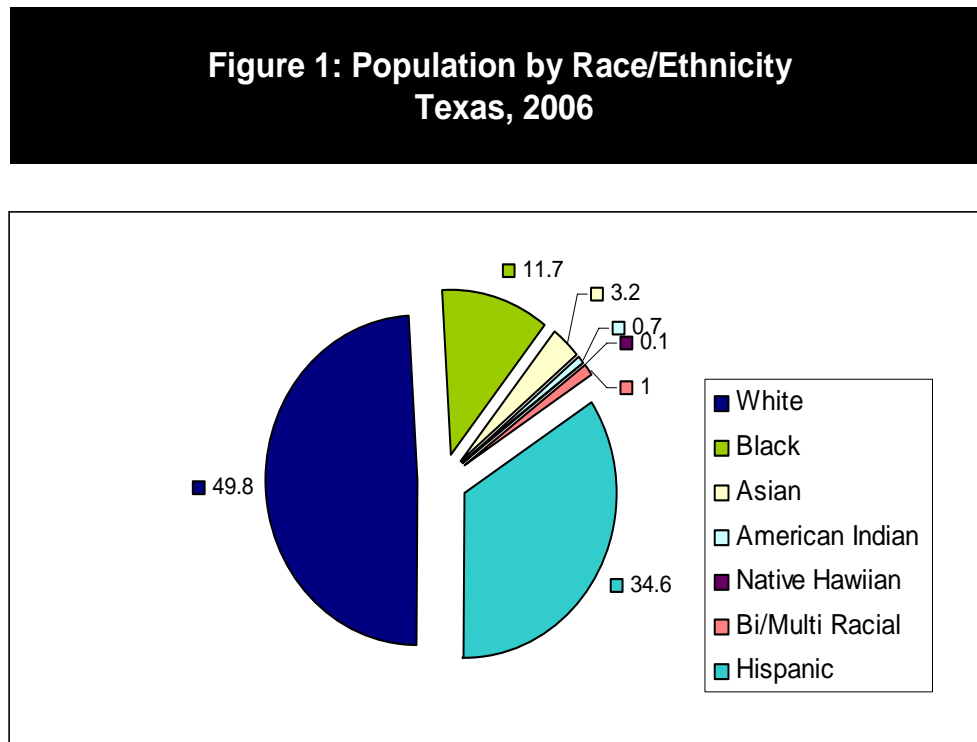


Figure 1 Data Source: <http://quickfacts.census.gov/qfd/states/48000.html>

Population projections from the Office of the State Demographer predict that the number of White people in Texas is declining. This decline is projected to continue and increase over the next several decades. By 2004, White people accounted for less than 50% of the Texas population. By 2040, the majority of the people living in Texas will be Hispanic. Growth in the overall population will be due to growth in the Hispanic population (TXSDCOSD, 2006).

Age and Sex

The median age of Americans and Texans has been increasing over the past century. In 1900, the median age of Texas residents was 18.7 years; 26.4 years in 1970; and 32.3 years in 2000. National numbers were similar (Murdock et al., 2002). By 2006, the median age of Texas residents was 34.0 years. Other demographic characteristics for Texans as of 2006 include the following:

- Approximately 11% of Texans were aged 65 and older.
 - Substantial growth in this group is expected over the next several decades.
- Approximately 28.3% of the Texas population were children and adolescents aged 20 and younger.
- Males and females made up equal percentages of the population.
- Approximately 70% of the oldest age group (aged 85 and older) was female.

Source: U.S. Census Bureau Current Population Survey, Annual Social and Economic Supplement, 2006

Figure 2 (below) provides more details about the composition of the residents of Texas by age group as of 2006. There are seven age groups that range from five years and under to 75 years and older. People aged 55 and older make up 17% of the population. People in the 25 to 45 year old age group account for 32% of Texas residents. Children, adolescents, and young adults aged 0 to 24 years account for 39% of Texas residents and represent the highest risk age group for poor oral health.

**Figure 2: Population by Age
Texas, 2006**

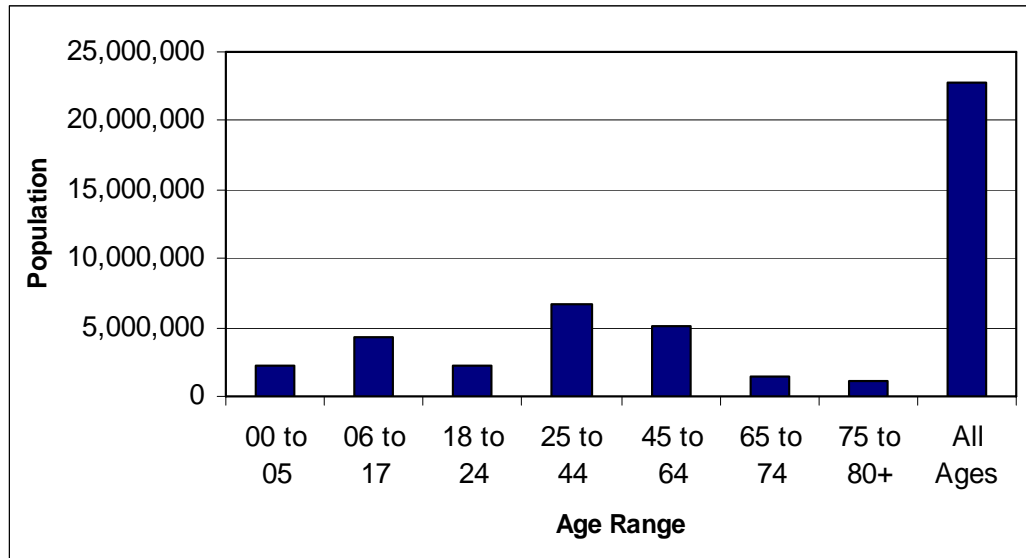


Figure 2 Source: U.S. Census Bureau Current Population Survey, Annual Social and Economic Supplement, 2006

By 2040, the median age of Texans will rise from 38.1 to 38.6. Texans ages 65 years or older are expected to account for approximately 16% of the population by 2040, compared to 9.9% in 2000. This percentage means that by 2040, the number of people 65 years or older could be as high as 8.2 million: a 295% increase from the 2000 numbers (TXSDCOSD, 2006).

White people will have the highest median age according to these projections. In 2040, the median age is projected to be between 45.6 and 46.2 years for White people, between 39.8 and 40.2 years for African Americans, between 34.0 and 35.2 years for Hispanic people, and between 48.3 and 49.3 years of age for the other racial/ethnic groups (TXSDCOSD, 2006). Again, many oral health problems and challenges are specific to the different age groups.

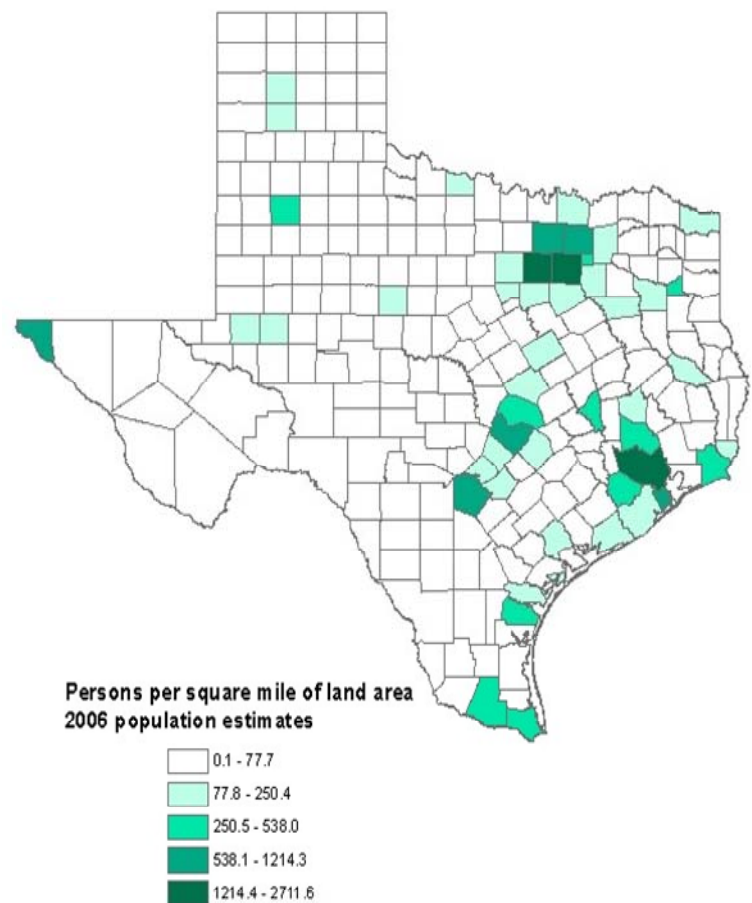
Urban and Rural Populations

In 2004, six of the 21 largest cities in the U.S. were in Texas (U.S. Census Bureau, 2004). Of the 254 counties in Texas, the six most populated counties were: (in alphabetical order) Bexar, Dallas, Harris, Hidalgo, Tarrant, and Travis. Fifty percent of Texas residents live in these six counties. Figure 3 is a map of the population density of the State. This map shows where these six counties are located within the State. The

concentration of the residents is located in these six counties, but vast sparsely populated areas also separate these counties.

During the 1990s, counties with large metropolitan areas grew by 22.7%, which was four times higher than for non-metropolitan counties. Residents of rural areas are at greater risk for many health problems including oral diseases. Risk factors include difficulties in accessing preventive and treatment services. Transportation and time are usually identified as barriers to access for rural residents (Burt, 1999).

Figure 3:
Population Density
Texas, 2006



According to the Texas State Data Center and the Office of the State Demographer, by 2010, 25 million people will be living in Texas. By 2040, more than 51.7 million people will be living in Texas (TXSDCOSD, 2006).

Across rural and urban populations, household composition has changed over the past decades. Households have seen a dramatic shift over the past few decades from married couples with children to unmarried couples/individuals with and without children. Married couples with children made up 27.1% of Texas households in 2000

(Murdock et al, 2002). The implications include fewer resources directed towards children, and the responsibility of financial burden falling onto single individuals.

Population projections are useful in explaining the challenges of population growth and rapid changes in the composition of the population of Texas (TXSDCOSD, 2006). However, populations can mobilize and migrate in unforeseen ways. The Office of the State Demographer cautions that these projections be used with care due to inherent limitations. While the magnitude of population growth remains speculative, experts do agree that the population will grow (Murdock et al, 2002). The demand for housing, education, welfare, and employment services, as well as for income and wealth and for State costs and revenues change in direct proportion to population characteristics (Murdock et al, 2002). If the socioeconomic differences and the disparities that exist between groups do not change, and the population continues to expand, the State's public health system will continue to be extremely over-burdened.

Access to Care

The challenge for State government is to ensure that all Texans have the skills and other resources necessary to compete in the global economy in order to maintain private-sector growth and the funding of public services (Murdock et al., 2002). Individuals need to be in good health and have good oral health to compete and contribute in a future of economic challenges and change.

The Texas Legislature mandated DSHS to implement a comprehensive oral health services program statewide or geographically targeted for eligible, indigent, school-aged, Texas residents through the Texas' Oral Health Improvement Act (OHI) in 1986. These services may include:

- Treatment services;
- Oral disease prevention;
- Oral health education and promotion; and,
- Facilitation of access to oral health services.

The OHI Act also states the department may conduct field research, collect data, and prepare statistical and other reports relating to the need for and the availability of oral health services.

Access/accessibility refers to "being accessible or able to be reached." For this purpose, the measurement of oral health care access includes the availability of oral health care facilities and the number of providers in each county. However, this alone is not an adequate measure of accessibility. The hours and location of services, eligibility criteria, cultural and language competency of health professionals, cost of services and/or the presence of health coverage and how services are offered are all interrelated, making difficult the process of measuring true access.

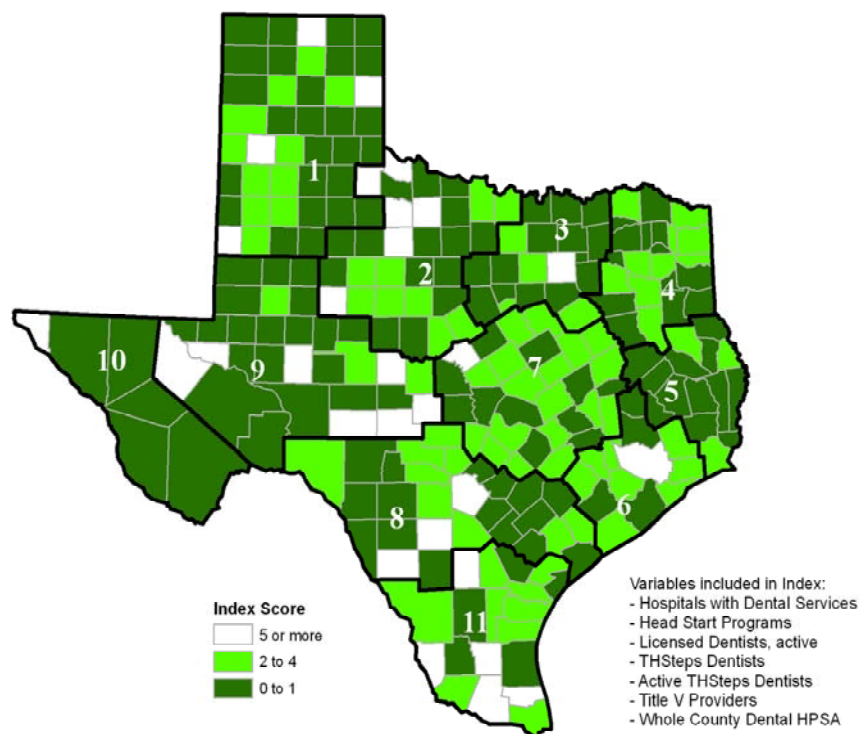
Access can be classified as: a) potential access, in which the characteristics and resources of health systems influence the use of health services; b) realized access, in

which available health care has been utilized; c) equitable access, in which the distribution of health services is determined by social, economic, and demographic characteristics and need; d) effective access, in which the use of health services improve the health status or satisfaction; and e) efficient access, in which the use of health services minimize the cost of health services and maximizes the health status or satisfaction.

The oral health of children has improved significantly over the past few decades and most American children enjoy excellent oral health. Nonetheless, a significant subset of the population suffers a high level of oral disease and little progress has been made in reducing cavities in children living in poverty, who generally have less access to dental care and appear to be more vulnerable to dental decay. The most advanced cases of oral disease are found primarily among children living in poverty, some racial/ethnic minority populations, disabled children, and children with HIV infection (Office of Surgeon General, 2000).

Figure 4 (below) shows the differential rates of access to oral health services in the health service regions (HSR) of Texas. Counties may be designated partial or complete “health professional shortage areas” (HPSA). Hospitals in these locations may not provide dental services. Variables for constructing the index for access were selected based on the presence of dental providers and facilities that serve the low-income populations. Index variables include the number of hospitals with dental services, the number of Head Start programs, the number of licensed active dentists, the number of THSteps dentists, the number of active THStep dentists, the number of Title V providers, and finally the number of whole counties within an HSR that is an HPSA. The index is interpreted from low to high, with a low score indicating poor access, and a high score indicating good access.

**Figure 4:
Children's
Access
Index
Texas,
2006**



The HSR with the highest percentage of counties with a score of zero on the access index are HSR 1 (63%), 9 (60%) and 10 (83%). The only three HSR'S where less than 20% of the counties scored a zero on the access index are Regions 4 (17%), 7 (11%) and 11 (16%). Region 6 is the only HSR where none of the counties scored zero on the access index.

Of the 30 (12%) counties that scored five and above on the access index, nine had a score of five, four a score of six, three a score of seven, one a score of eight and nine a score of nine. Only four counties scored ten on the access index: Harris (HSR 6), McMullen (HSR 11), Mitchell (HSR 2), and Reeves (HSR 9). Access to dental services however, is uneven within all regions.

Texas has witnessed many successes in improving the oral health of its residents, however this review shows that new obstacles and public health challenges await. Most conversations regarding population shifts center on the economic and financial implications. The economic health of the State does not exist separately from the public health of the State and vice versa. An important resource and key component of preparing for economic change and challenges is having a healthy workforce. An essential part of preparing Texans for the future is ensuring good health. An essential

part of good health is good oral health. To ensure good oral health, the greatest challenge is access to care.

IV. THE BURDEN OF ORAL DISEASES

a. Prevalence of Disease and Unmet Needs

This section presents data on the prevalence of oral health problems. Descriptions of the social and economic impacts of oral disease on Texans are also presented. Oral health surveillance data obtained through national, state, and community level surveys, collect data on oral health status indicators consistent with *HP 2010*.

i. Children

A brief overview of the socio-demographics of Texas children as of 2006 is provided below as a reference for the prevalence and incidence of oral health problems.

- In Texas, there are 3,472,629 families, with 6,214,421 children.
 - 24% (1,462,097) of children live in poor families (National; 18%), defined as income below 100% of the federal poverty level (approximately \$20,000 for a family of four).
 - 45% (664,837) of children in poor families have at least one parent who is employed full-time year-round.
 - 50% (649,032) of children whose parents do not have a high school diploma live in poor families.
 - 52% (756,760) of children in poor families live with a single parent.
 - 8% (194,881) of White children live in poor families.
 - 26% (200,441) of African American children live in poor families.
 - 36% (1,026,395) of Hispanic children live in poor families.
 - 26% (582,018) of children under age six live in poor families.
 - 26% (226, 385) of children in rural areas live in poor families.
- (NSCH, 2006)

Oral health is critical to the overall health and well being of children. Good oral health remains the most important target area for oral disease prevention and intervention efforts for children. If left untreated, the pain and infection of tooth decay can lead to problems in eating, speaking, and learning. A growing body of research has shown a link between the health of the teeth and gums and academic performance. Tooth decay can lead to severe pain and discomfort. Chronic pain may result in an inability to concentrate, decreased motivation to complete tasks, a lack of self-confidence and poor academic performance (U.S. DHHS, 2003). Annually, an estimated 51 million school hours across the nation are lost because of dental-related illness (Satcher, 2000).

In children, tooth decay (dental caries) is the most common chronic childhood disease. Acids produced by bacteria on the teeth cause mineral depletion from the enamel and dentin (the hard substances of teeth). Dental caries can have serious consequences

including the loss of tooth structure, inadequate tooth function, unsightly appearance, pain, infection, and tooth loss. Tooth decay is five times more common than asthma, and seven times more common than hay fever (U.S. DHHS, 2003). The Surgeon General described the emergent reality of poor oral health for children very poignantly.

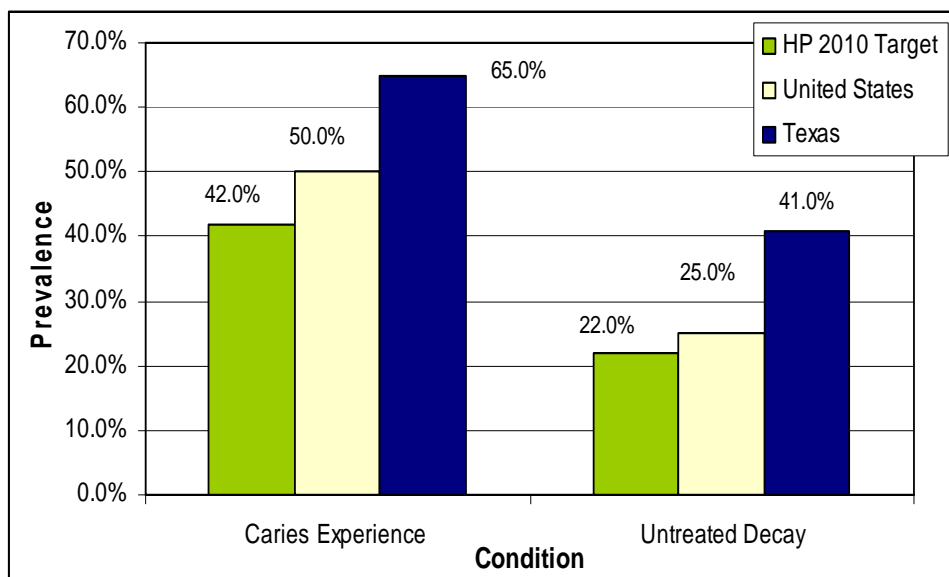
"The daily reality for children with untreated oral disease is often persistent pain, inability to eat comfortably or chew well, embarrassment at discolored and damaged teeth, and distraction from play and learning."

- (Finn and Wolpin 2005 p 28, U.S. Department of Health and Human Services, 2000, p. 108).

The prevalence of tooth decay (caries) is not uniformly distributed in the United States or in Texas. Some groups of children are more likely to experience the condition and less likely to receive treatment for it. For example, children age six to eight are at greater risk for tooth decay, but are less likely to receive treatment. The *HP 2010* targets a prevalence rate of 42% from 52% for dental caries across all age groups of U.S. children.

The recommendation of the Surgeon General is that preventive dental care visits begin for children by the age of one. Despite this recommendation, the National Survey of Children's Health (NSCH) reported that only 10.1% of 1-year-olds and 23.8% of 2-year olds received a preventive dental visit within the last year (NSCH, 2006). The *HP 2010* target proportion for six to eight year old children is 20% from 21%. Figure 5 (below) provides details regarding children's dental health in Texas, the nation, and for the *HP 2010* targets.

Figure 5 : Dental Caries, Untreated Decay among 6 to 8 year olds in Texas, the U.S. and HP 2010 Targets



Source: Healthy People 2010, 2nd edition. U.S. Dept of Health and Human Services, November 2000.
 State Data Source(s): Basic Screening Survey, Texas Department of State Health Services, Oral Health Program 2006 (n=3565034). Percentages are weighted to population characteristics. Estimated number in population adjusted (weighted) to represent total population of children, 0 -17 yrs old, in the sampled areas. The population weights used for the BSS data make adjustments for the probability of being selected, age, race/ethnicity, sex, and other demographic characteristics.

Tooth condition and preventive visits are monitored by DSHS as consistent with the National Survey of Children's Health, which allows comparisons with other states. Table 2 (below) shows the percentages of children and adolescents who are reported to have teeth in excellent or good condition. In 2003, the proportions of children who reported to have teeth in excellent or very good condition were lower than national averages for every age group except for children ages six to eleven. Texas percentages of children with excellent or good dental health was lower than national averages across all federal poverty levels (FPL), except for those children who were at 0-99% FPL. Texas had higher proportions of both male and female children ages one to five with good/excellent dental health compared to national averages. Finally, Texas had higher proportions of African American children who were reported to have teeth in excellent or very good condition.

Table 2 also shows state and national percentages of children and adolescents who have received preventive dental care during the past 12-month period. Texas percentages were lower than national averages except when analyzed by race/ethnicity. Higher percentages of White, Black Non-Hispanic, and multiple race children in Texas were reported to have received preventive visits than national averages. However, the percentage of Texas children and adolescents in any age group, from one to seventeen, and every FPL, except those children at 400%, were lower in national comparisons for preventive dental care visits. These data report that as of 2003, *HP 2010* targets of oral

health status and preventive visits for low income children ages 6 to 8 exceeded national averages.

These findings are consistent with smaller studies of pediatric populations. In 2001, the University of Texas Health Science Center Dental Branch completed a dental study of children in seven counties around Houston. In all, 292 pre-kindergarteners were studied.

Table 2. Condition of Teeth and Preventative Visits: United States and Texas				
	Condition of Teeth		Preventive Visits	
	Teeth in excellent or very good		Preventive dental care in the past	
	US %	Texas %	US %	Texas %
Total Percent of Children	72.0	65.6	68.5	61.3
Age 1-5	48.0	49.8	77.7	72.6
Age 6-11	83.7	75.2	61.8	51.0
Age 12-17	79.8	69.8	67.5	61.7
0-99% Federal poverty level	58.1	59.2	48.8	43.1
100-199% Federal poverty level	65.8	56.1	60.2	52.5
200-399% Federal poverty level	77.0	70.4	75.0	69.7
400% Federal poverty level or more	82.4	78.4	82.8	83.8
Non-Hispanic White	77.0	72.4	76.4	78.9
Non-Hispanic Black	66.4	67.1	61.1	56.1
Hispanic/Latino	60.9	58.9	46.7	44.0
Non-Hispanic Multiple Races	68.1	52.7	69.9	73.0
Non-Hispanic Other Race	70.3	67.1	67.2	52.5
Total Percent Males	71.3	64.4	67.6	59.9
Age 1-5	47.8	48.6	76.4	70.1
Age 6-11	82.8	73.4	61.8	50.8
Age 12-17	79.0	69	66.2	60.4
Total Percent Females	72.7	66.8	69.3	62.8
Age 1-5	48.1	51	79.1	75.2
Age 6-11	84.5	77.2	61.9	51.3
Age 12-17	80.6	70.5	68.8	62.9

Data Source: National Survey of Children's Health 2003.U.S. Department of Health and Human Services, 2005.

In addition, DSHS OHP monitors caries experience and untreated decay as consistent with the National Oral Health Surveillance System (NOHSS), which allows comparisons with other states and with the nation. The DSHS OHP has recently completed the Basic

Screening Survey (BSS) developed by the Association of State and Territorial Dental Directors (ASTDD).

The prevalence of decay in children is measured by assessing caries experience. Caries experience is defined by: treated decay (if the child has ever had decay and now has fillings), untreated decay (active unfilled cavities), and urgent care (reported pain or a significant dental infection that requires immediate care). The most recent data for six to eight year old children in Texas and the nation, for selected demographic groups, are summarized in Table 3.

Table 3. Dental Caries Experience, Untreated Dental Decay, and Urgent Need for Dental Care among 6 to 8-year-old Children: United States and Texas					
	Dental Caries Experience		Untreated Decay		Urgent Care
	US^a	Texas^f	US^a	Texas^f	Texas^f
	(%)	(%)	(%)	(%)	(%)
TOTAL	50	66	26	40	13
Race or Ethnicity					
American Indian or Alaska Native	91 ^b	87	72 ^b	47	1.5
Asian	90 ^c	58	71 ^c	45	19
Native Hawaiian or other Pacific Islander	79 ^d	100	39 ^d	90	33
Black or African American	44 ^e	63	36 ^e	38	12
White	38 ^e	61	26 ^e	39	12
Hispanic or Latino	DSU	73	DSU	42	13
Sex					
Female	49 ^e	67	24 ^e	39	12
Male	50 ^e	66	28 ^e	42	13
Children Eligible for Free or Reduced Lunch Program					
Yes	DNA	36 ^f	DNA	36 ^f	13 ^f
No	DNA	64 ^f	DNA	64 ^f	87 ^f
Select Populations					
3rd grade students	60 ^e	69 ^f	57 ^e	36	9 ^f

Table 3 Sources:

Healthy People 2010, Progress Review, 2000. U.S. Department of Health and Human Services. Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls.

<These data will be updated in 2006.>

DNA = Data not analyzed

DNC = Data not collected

DSU = Data are statistically unreliable or do not meet criteria for confidentiality

a All national data are for children aged 6–8 years old, 1999–2000, unless otherwise noted.

b Data are for Indian Health Service areas, 1999.

c Data are for California, 1993–1994.

d Data are for Hawaii, 1999.

e Data source: National Health and Nutrition Examination Survey (NHANES), 1994–1999.

f State Data Source(s): Basic Screening Survey, Texas Department of State Health Services, Oral Health Program 2006 (n=3565034). Percentages are weighted to population characteristics. Estimated number in population adjusted (weighted) to represent total population of children, 0–17 yrs old, in the sampled areas. The population weights used for the BSS data make adjustments for the probability of being selected, age, race/ethnicity, sex, and other demographic characteristics.

For children, cavities are a common problem that begins at an early age. In the U.S., tooth decay affects nearly a fifth of two to four year olds, more than half of eight year olds and more than three-fourths of 17 year olds (US DHHS CDC, At a Glance 2003). Once established, the disease requires treatment. A cavity only grows larger and more expensive to repair the longer it remains untreated.

The easiest way to prevent children from further decay and cavities is to monitor their eating habits. Avoiding sugary snacks such as candies, chocolate, caramels, soda, chocolate milk, and other foods that contained refined sugar, or at least abstain from sticky, chewy candy, which tends to linger on teeth throughout the day. After eating a sugary snack, children should be encouraged to brush and rinse or eat a piece of fruit (US DHHS Oral Health In America, 2000). According to the National Soft Drink Association, soft drink consumption continues to grow, and accounts for nearly 30% of the beverages Americans drink (Academy of General Dentistry, 2003).

The link between oral health and poor nutrition, particularly excessive sugar consumption, may have important implications on the rising prevalence of obesity and overweight among children and adolescents in the U.S. Research has shown that dietary habits of school children encouraged an increase in sugar intake leading to a greater risk of cavities (Academy of General Dentistry, 2003). Recently, several states have begun to focus attention on the connection between increased soda consumption and rising rates of dental caries and obesity among children and adolescents. Because of constrained education budgets, many schools have entered into contracts with soda companies as a significant source of additional revenue. Such contracts may have significant negative effects on children's and adolescents' health and dental health (ASTSHO, 2002). In 2004, the Texas Department of Agriculture issued new nutritional guidelines for Texas ISD's. Restrictions now apply to foods and beverages sold in vending machines (Reeves, 2003).

ii. Adults

While the percentage of children and adolescents with tooth decay is striking, the percentage of adults suffering from dental problems is often even more alarming. Data from the most recent U.S. Department of Health and Human Services survey show that nationally 85% of adults have at least one tooth with decay or a filling on the crown portion of the tooth. Like children and adolescents, adults may experience new decay on the crown (enamel covered) portion of the tooth. However, adults may develop caries on the root surfaces due to normal gum recession associated with aging. As the root surfaces become exposed to bacteria and carbohydrates, caries may form in this area of the tooth. Root surface caries was found in 50% of the USDHHS survey participants aged 75 years or older (USDHHS, 2000a). Not only do adults experience dental caries, but also a substantial proportion of that disease is untreated at any point in time.

Tooth Loss

A full set of teeth means retaining the 28 natural teeth, exclusive of third molars. With adequate personal and professional care in addition to population-based prevention, individuals can possibly keep a full set of their teeth throughout the lifespan. However, the reality is that tooth loss over the lifespan is very widespread.

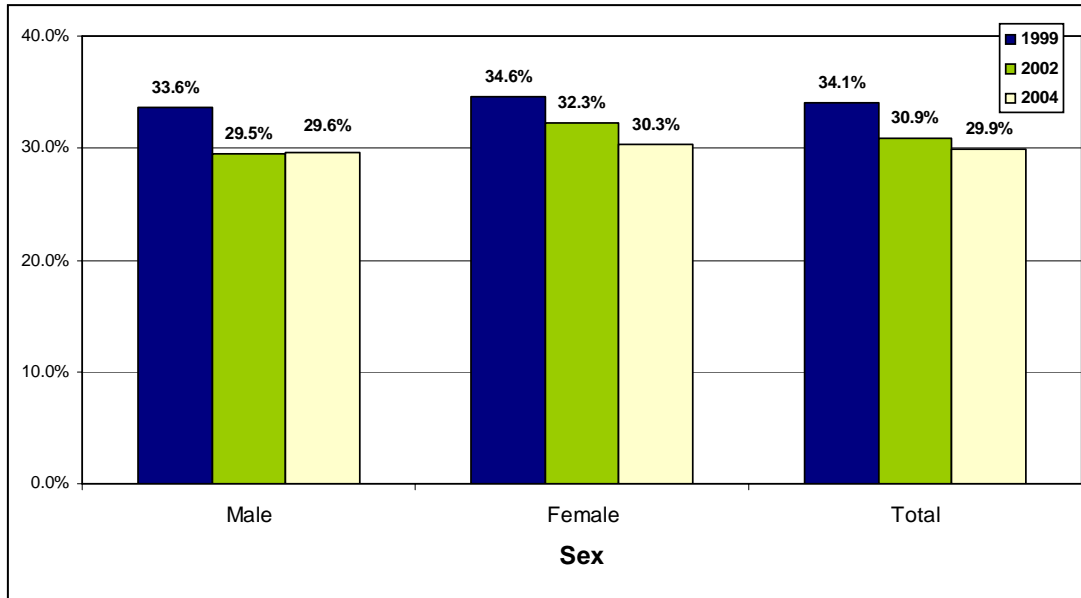
The most common reasons for tooth loss in adults are tooth decay and periodontal (gum) disease. Tooth loss can also result from infection, unintentional injury, and head and neck cancer treatment. Certain orthodontic and prosthetic therapies may require the removal of teeth as well. Because the ability to chew is inhibited, tooth loss can impede digestion. Social functioning and mobility are restricted because tooth loss can reduce the ability to speak, to form sounds, and can be unsightly. Nutritional concerns may arise because of tooth loss. Oral health problems can limit a person's food choices and lead to poor nutrition (Sahyoun, 2004).

While the U.S. has witnessed an overall decrease in the prevalence of tooth loss in its population, some groups remain unchanged or have even increased in their prevalence of tooth loss. For example, tooth loss is more prevalent among females than males of the same age. Tooth loss is also more prevalent among African American people than White people. In fact, the number of African Americans who have lost permanent teeth is three times greater than that of White Americans.

Results of the Behavioral Risk Factor Surveillance Survey (BRFSS) show that females and minority populations suffered more from tooth loss than males or White people. The BRFSS is an important source of information. This survey is conducted by phone with a sample of non-institutionalized adults in Texas. The purpose of the BRFSS is to collect data on a variety of health issues (e.g. seat belt usage and cardiovascular risk factors) as reported by survey participants. Since 2002, the BRFSS has collected oral health data every other year.

Figure 6 (below) shows that from 1999 to 2004, the percentage of participants who reported having one - five teeth removed had declined over the six years. However, the percentage of females who reported tooth removal was higher than male percentages at each time point. Proportions of females declined from approximately 35% in 1999 to 30% in 2004. Proportions of males declined from approximately 34% 1999 to 30% in 2004.

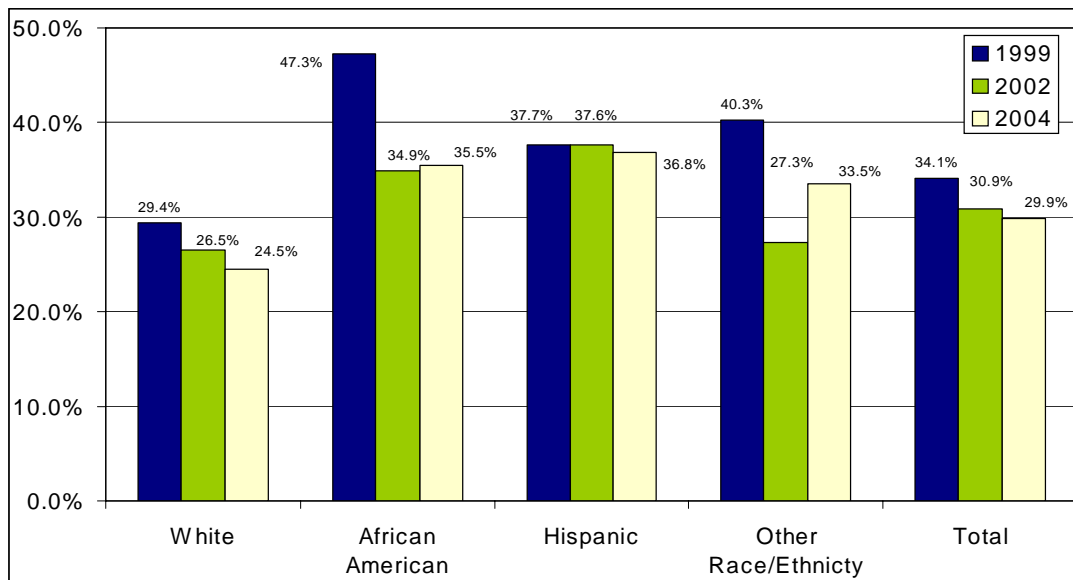
**Figure 6: Adults with 1 to 5 Teeth Removed
Texas BRFSS, 1999 – 2004**



Data Source: Texas BRFSS, 2006.

Figure 7 (below) presents the prevalence of tooth extractions in Texas by race/ethnicity. Despite the decrease of extractions between 1999 and 2004, (from 47% to 36%) among African Americans, extractions reported for Hispanics and African American people was higher than that of White respondents for the period. Hispanic participants reported only a slight decrease from 38% in 1999 to 37% in 2004.

**Figure 7: Adults with 1 to 5 Teeth Removed by Race/Ethnicity
Texas BRFSS, 1999 - 2004**



Data Source: Texas BRFSS, 2006.

Some social and economical factors explain the greater prevalence of tooth loss and removal among female and minority groups. First, as a group, African Americans and women are disproportionately represented among poor and disadvantaged populations. Second, low income is related to low educational attainment. This association has been recognized as part of the “cycle of poverty,” in that low educational attainment is not only an outcome of low income, but also predicts low income. Third, low educational attainment has been most often cited as the strongest and most consistent predictor of poor oral health. Finally, women and minorities, due to a number of socio-political factors, have particular difficulty in exiting the cycle of poverty and are therefore more vulnerable to poor oral health and tooth loss.

National data on the percentage of adults who have had no tooth extractions (because of disease vs. trauma) and the percentage who have lost all of their permanent teeth are presented in Table 4.

Table 4. Proportion of US Adults Aged 35-44 who have No Teeth and Proportion of Adults Aged 65-74 who have Lost All Natural Teeth

	Aged 35–44 Years No Tooth Extractions United States ^a (%)	Aged 65–74 Years Lost All Natural Teeth United States ^b (%)
Healthy People 2010 Target	42	20
TOTAL	39	25
American Indian or Alaska Native	23 ^c	25 ^c
Asian	DNC	DSU
Black or African American	12 ^d	34
White	34 ^d	23
Hispanic or Latino	DSU	20
Mexican American*	38	DNC
Not Hispanic or Latino	DNA	24
Black or African American, not Hispanic	30	34
White	43	23
Female	36	24
Male	42	24
Less than high school	15 ^d	43
High school graduate	21 ^d	23
At least some college	41 ^d	13
Persons with disabilities	DNA	34
Persons without disabilities	DNA	20

Table 4 Sources:

*Healthy People 2010, Progress Review, 2000. U.S. Department of Health and Human Services.

Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls. Accessed July 26, 2005.

<These data will be updated in 2006.>

DNA = Data not analyzed

DNC = Data not collected

DSU = Data are statistically unreliable or do not meet criteria for confidentiality

^a National data are for 1999–2000 unless otherwise indicated.

^b National data are for 2002 unless otherwise indicated.

^c Data are for Indian Health Service areas, 1999.

^d Data are from NHANES III, 1988–1994.

Periodontal (Gum) Diseases

A number of diseases affect the gums. A particularly common condition is gingivitis. This disease is usually the result of poor oral hygiene; however, it could be the result of other conditions such as diabetes. Gingivitis is characterized by red, swollen, and bleeding tissue (gums) closest to the teeth. The condition is usually preventable by good oral hygiene and reversible with proper treatment and care. Personal care to prevent gingivitis means the daily removal of dental plaque (i.e. brushing and flossing). Without consistent personal prevention efforts, gingivitis can progress to more serious and destructive diseases, such as periodontitis.

Symptoms of periodontitis include the loss of the tissue and bone that support the teeth. People with periodontal diseases are particularly vulnerable to tooth loss unless appropriate treatment is received. In fact, periodontitis is a leading cause of bleeding, pain, infection, loose teeth, and tooth loss among adults (Burt & Eklund, 1999). The use of tobacco products has been identified as a cause. Smoking has been linked to 50% of all cases of adult periodontitis. Smoking can promote gingivitis, and all periodontal disease begins as gingivitis. Therefore, prevention of periodontal diseases involves smoking prevention and the prevention of gingivitis.

The prevalence of gingivitis and destructive periodontitis in Texas and the United States is summarized in Table 5. Nationally, the prevalence of gingivitis is highest among American Indians and Alaska Natives, Mexican Americans, and adults with less than a high school education. Cases of gingivitis will likely remain a significant problem. The prevalence may increase as tooth loss from dental caries declines or because the use of some systemic medications increases. Data on the prevalence of destructive periodontitis for Texas has not been collected at this time.

Table 5. Target Proportion of Adults aged 35-44 Years with Gingivitis: United States and Texas		
	United States^a	Texas^e
	(%)	(%)
Healthy People 2010 Target	41	41

Table 5 Sources:

Healthy People 2010, Progress Review, 2000. U.S. Department of Health and Human Services.

Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls.

* Defined as 1 or more teeth with 4 mm or more loss of periodontal attachment.

^a National data are from NHANES III, 1988–1994 unless otherwise indicated.

Oral Cancer

In 2004, an estimated 28,000 new cases of oral cancer were reported in the United States. Deaths from these cancers totaled 7,200. Some groups of people experience a disproportionate burden of oral cancer. For example, cancer of the oral cavity or pharynx is the fourth most common cancer among African American males and the seventh most common cancer among White males (Ries et al. 2004). Nearly 90% of the cases of oral cancer in the U.S. occur among persons aged 45 years or older. The age-adjusted incidence and mortality rates were more than twice as high for males than females for any age group (4.9 vs. 1.7 per 100,000 persons).

The evidence is well established that tobacco use is a cause of cancer. All nicotine delivery methods, including smokeless tobacco and cigars, have been linked to cancers throughout the body (Shanks & Burns 1998). Smoking, chewing, dipping or snuffing tobacco have been identified as determinants of oral cancers including cancers of the mouth, throat, larynx (voice box) and esophagus (USDHHS 1986; IARC 2005). The consumption of alcohol often accompanies cigarette smoking. The combination of smoking and alcohol has been linked to more than 75% of oral cancers (Blot et al. 1988).

In the United States, smoking has had an enormous toll on public health and the economy. On average, smokers are in poorer health than non-smokers. In 2002, all cancers cost the U.S. over \$170 billion. This figure includes an estimated \$110 billion in lost work due to disability and death. The remaining \$60 billion was spent on medical treatment (CDC, 2004). Smoking cessation campaigns are particularly important because quitting smoking is effective in terms of reducing cancer and other health risks. A person who quits smoking will have lowered his/her risk of cancer by 50% within five years (CDC, 2004).

Survival rates for oral cancer have not improved substantially over the past 25 years. More than 40% of persons diagnosed with oral cancer die within five years after diagnosis (Ries et al., 2004). However, survival rates vary according to the stage at diagnosis (i.e. localized vs. distant). If diagnosed and treated early, the five-year survival rate is 81%. In contrast, the five-year survival rate is only 51% once the cancer has spread to the lymph nodes at the time of diagnosis. The survival rate drops to 29% for persons whose cancer has spread to distant organs or lymph nodes.

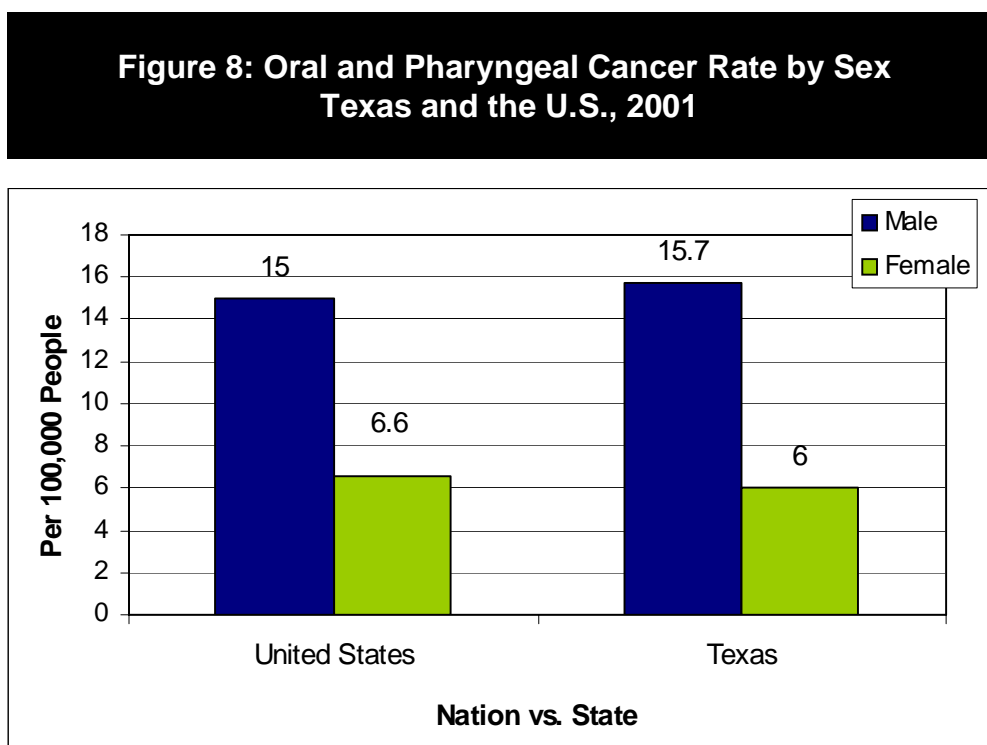
In Texas, an estimated 14,000 cases of oral cavity and pharynx cancer were diagnosed and reported from 1995 to 2002. Oral cancer represents about 2.4% of the cancer cases diagnosed annually and is attributed to 1.5% of all cancer related deaths.

Figures 8 and 9 show the death rates for oral cancer in Texas and U.S. by sex and race/ethnicity. Figure 9 shows that the combined 1997 and 2001 death rate for males

was over two times that of the female rate in both Texas and national comparisons. Texas had a slightly higher oral cancer death rate for males than the national rate (15.7 vs. 15.0 per 100,000 persons). For females, Texas had a slightly lower rate (6.0 vs. 6.6 per 100,000 persons).

The use of tobacco, including smokeless tobacco (USDHHS, 1986; IARC, 2005) and cigars [Shanks & Burns, 1998] also increases the risk of oral cancer. Dietary factors, particularly low consumption of fruit, and some types of viral infections also have been implicated as risk factors for oral cancer (McLaughlin et al., 1998; De Stefani et al., 1999; Levi, 1999; Morse et al., 2000; Phelan 2003; Herrero, 2003). Radiation from sun exposure is a risk factor for lip cancer (Silverman et al., 1998).

The incidence rates of cancers of the oral cavity and pharynx by sex for Texas and the United States are shown in Figure 8. The oral cancer death rate by sex and race/Hispanic origin for Texas and the United States is shown in Figure 9.



*Per 100,000, age-adjusted to 2000 U.S. population

Source: National Cancer Institute, SEER

For more information on cancer profiles and for cancer data categorized by site, race, and gender, see: NCI state cancer profiles at <http://statecancerprofiles.cancer.gov/>.

CDC's NPCR Web site is available at <http://apps.nccd.cdc.gov/uscs/index.asp?Year=2001>.

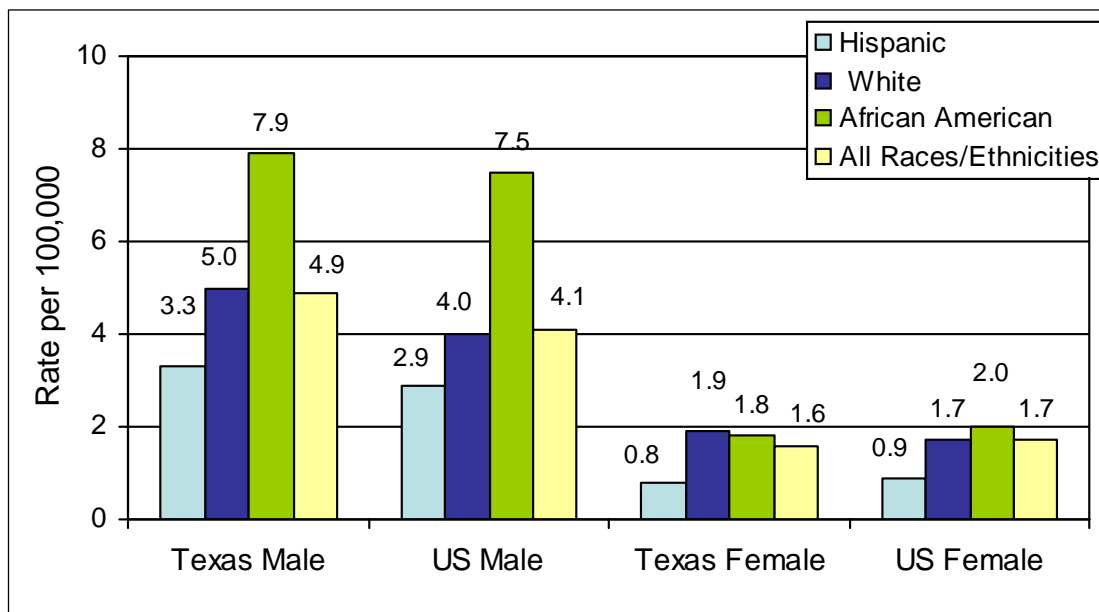
Texas Source: DSHS Cancer Registry Oral & Pharyngeal Cancer Mortality Rate, Average Annual Rates 1997-2001

Figure 9 compares the oral cancer death rate in Texas of Hispanic, White, and African American people to national averages. The graph shows that men have higher oral cancer death rates than women regardless of race/ethnicity. African American males have the highest rate at 7.9 and 7.5 per 100,000 persons (Texas and national average). Hispanic males have the lowest rate of all males. Male rates for Texas exceed national rates for every racial/ethnic group. The rates for White males exceed the national average for the same group by 1.0 percentage point (5.0 vs. 4.0 per 100,000), which is the biggest difference for any local vs. national comparison. Texas females are slightly below the national oral cancer death rate. African American and White women have very similar rates in Texas and nationally. Hispanic females have the lowest rate of all female groups in both state and national comparisons.

The most significant health disparity appears between African American men and any other group. Nationally, African American men are more likely than any other group to develop oral cancer and much more likely to die from it. State efforts to reduce Texans' risks for oral cancers include tobacco control efforts, oral health advocacy, and educational initiatives. These results point to the need for special efforts to target those groups most at risk for oral cancer, which necessarily means targeted outreach campaigns for African American men.

The earlier oral cancer is diagnosed, the better the prognosis. Therefore, several *HP 2010* objectives specifically address early detection of oral cancer. Objective 21-6 is to "Increase the proportion of oral and pharyngeal cancers detected at the earliest stage." Objective 21-7 is to "Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancer" (USDHHS, 2000b). Data show that U.S. males and minorities have lower proportions of early detection (stage I, localized) (*Healthy People 2010, Progress Review, 2000* U.S. Department of Health and Human Services).

**Figure 9: Oral Cancer Death Rate by Sex and Race/Ethnicity
Texas and the U.S., 1997-2001
(combined)**



*Per 100,000, age-adjusted to 2000 U.S. population

Source: National Cancer Institute, SEER

For more information on cancer profiles and for cancer data categorized by site, race, and gender, see: NCI state cancer profiles at <http://statecancerprofiles.cancer.gov/>.

CDC's NPCR Web site is available at <http://apps.nccd.cdc.gov/uscs/index.asp?Year=2001>.

Texas Source: DSHS Cancer Registry Oral & Pharyngeal Cancer Mortality Rate, Average Annual Rates 1997-2001

b. Disparities

Low-income, minority, and disabled populations and/or women have difficulty accessing dental services, which make them more likely to develop oral health problems. Poor prevention in these populations often leads to more serious and expensive future health concerns (USDHHS, 2000). Previous sections approached the issue of oral health through specific conditions and then looked at the distribution of the specific conditions in the population. However, a thorough examination of the disparities in oral health between racial/ethnic and other groups is necessary in order to understand the entirety of the problem and the environment in which public health programs must operate. This section will examine the disparities in oral health more closely.

i. Racial and Ethnic Groups

Although the oral health status for the entire nation has improved in some aspects, particular groups of people still suffer disproportionately from oral health problems. Most oral diseases and conditions are complex and represent the product of interactions between genetic, socioeconomic, behavioral, environmental, and general health influences. An examination of the spread of oral diseases in the United States shows that Black, Hispanic, American Indian, and Alaska Native peoples generally have poorer oral health compared to White or Asian people.

Oral health problems that are disproportionately represented among racial/ethnic groups include, dental caries, poor or no treatment, and more extensive tooth loss. African American people in Texas and across the Nation are more likely than any other racial/ethnic groups in any age range to suffer from gum diseases (i.e. gingivitis and periodontitis). African Americans in comparison to White Americans are more likely to develop oral or pharyngeal cancer, are less likely to have it diagnosed at early stages, and experience a poorer five-year survival rate. Effective programs need to consider racial/ethnic (and cultural differences) in oral health and adapt outreach campaigns accordingly.

ii. Women's Health

Many statistical indicators show that certain oral health problems are less prevalent among women than men (Redford, 1993; USDHHS, 2000a). Adult females are less likely than adult males, across all adult age ranges, to suffer from severe periodontal disease. Both African American and White females have a substantially lower incidence of oral and pharyngeal cancers compared to males in those same racial/ethnic groups. However, a higher proportion of women have oral-facial pain, including pain from oral sores, jaw joints, face/cheek, and burning mouth syndrome. Reducing the prevalence and incidence of oral diseases among women represents a significant public challenge.

While most oral health issues are not unique to the female population, several gender specific factors place women at an increased risk for the development of oral health problems. Among the most prominent of these factors, the fluctuations in levels of estrogen and progesterone associated with puberty, pregnancy, and hormonal birth control use can exacerbate symptoms of gingivitis and promote the development and progression of periodontal diseases (Steinberg, 1999). Other factors contributing to the high prevalence of adverse oral diseases and conditions among women include the early onset of tobacco use; the incidence of eating disorders among adolescent and young adult aged women; the complex role patterns encountered by women throughout their life span; and the longer life expectancy women experience in comparison to men (Markovic, 2001).

In addition to physical and genetic factors, a number of psychosocial factors increase women's risks. The social status of women may affect the distribution of oral health problems. Many women live in poverty. Poor people often do not have health insurance. Poor women are often the sole heads of their households. For these women, obtaining needed oral health care may be especially difficult. Limited resources often mean choosing between dental treatment for themselves or for their children. Many poor women choose the latter. Cultural expectations of women may also affect the care they receive (e.g. when the provider and the patient are of different sexes, a lack of health advocacy).

The distribution of oral diseases among women is multi-faceted. Public health efforts should rely on multi-level preventions in which the economic, social, and physical differences of women are considered. Oral health issues are important to all women. In particular, pregnant women may face some unique problems because of poor oral health. The health of the child may be compromised as well.

Oral infections are a threat to maternal and child health. A growing body of research shows that women with periodontal (gum) disease are three to five times more likely to experience premature labor compared to women with healthy gums. Researchers hypothesize that bacteria and toxins from infected gums can enter the bloodstream and cause an inflammation. This inflammation may trigger premature labor. Premature labor can have serious effects on the mother's health and unborn child.

Researchers have identified maternal oral health status as a significant determinant of early childhood caries (ECC). Research has been shown that oral health can be compromised during the earliest stages of pregnancy. As previously stated, periodontal diseases have a potential impact on pre-term birth and low birth weight. Women with severe periodontal disease are more likely to have either pre-term labor or pre-term, premature rupture of membranes which in turn may lead to low birth weight infants. Mothers with good oral health tend to have full-term, normal birth weight infants.

Dental caries is a transmissible, infectious bacterial disease. Several researchers have proposed that oral bacteria are often transmitted from the mother to child. Behaviors that can result in the exchange of saliva including the sharing of eating utensils and kissing have the potential to facilitate the exchange of the bacteria associated with dental caries. Researchers have provided evidence that the principal bacteria associated with ECC is acquired from the mother sometime after an infant's first set of teeth begins to emerge (Caufield, 1982, 1993, 2000). In addition, infant feeding practices affect the development of ECC. Such practices include prolonged contact (longer than a meal time) with almost any liquid other than water (American Academy of Pediatrics, 2006).

Data from the CDC Pregnancy Risk Assessment Monitoring System (PRAMS), an ongoing state-based and population-based surveillance survey of women's attitudes, experiences, and behaviors before, during, and after pregnancy, have shown that most mothers do not make a dental visit during pregnancy (Ressler-Maerlender, 2005). Of those who reported having oral problems, 50% did not seek care. Some women believe that poor oral health status during pregnancy is normal. They may fear certain aspects of dental care during pregnancy. Some women believe that dental treatments may harm them or their fetuses (Ressler-Maerlender, 2005). The link between poor oral health and adverse health outcomes has been established. PRAMS researchers therefore maintain that if pregnancy modifies perceptions of oral health and dental care, then it may contribute to women's avoidance of dental treatment while pregnant (Ressler-Maerlender, 2005). The oral health needs of pregnant women present an opportunity for targeted efforts in Texas.

This discussion shows that the variability in health among women is as significant as the variability in men's health. Similar to men, health disparities among women also exist along racial/ethnic lines. While the determinants of oral disease among women are multiple and varied, the effect is still severe. As a group, women may deserve special considerations in terms of oral health efforts. Certain populations of women may also represent special targets for oral disease prevention campaigns. The consequences and complications of poor oral health are different for women than men. The ramifications are more far reaching for women in that pregnancy and infant health can be compromised. Women's experience with oral health problems necessitates coalition building with other public health programs such as those that target maternal and child health.

iii. People with Disabilities

The determinants of oral health problems of people with disabilities are complex. The inability to provide personal care and access to professional services contribute to the poor oral health of many people with disabilities.

No national studies have been conducted to determine the prevalence of oral diseases and craniofacial conditions that may affect people with disabilities. Results from

national surveillance data show that dental caries rates vary widely among people with disabilities, however the prevalence is still higher among people with disabilities than in the general population (USDHHS, 2000a).

Several smaller-scale studies show differential rates among people with mental disabilities. Results of these studies show that mentally challenged or developmentally delayed individuals compared to the general population have higher rates of periodontal disease. Significantly higher rates of poor oral hygiene and lower rates of diagnosis and treatment contribute to an elevated rate of gum disease among people with disabilities. Limitations in individual comprehension and/or possible physical limitations may inhibit personal prevention practices such as tooth brushing and flossing or seeking needed services.

There are more than 54 million individuals defined as disabled under the Americans with Disabilities Act, including almost a million children under the age of six years and 4.5 million children between six and sixteen years of age. This population presents a special challenge to oral health professionals and advocates. Oral diseases in the population exist in the presence of other serious physical or mental conditions. Indeed the presence of one condition may exacerbate the other. For Texas, effective prevention and intervention efforts would need to address these coexisting conditions.

As discussed, previously certain age groups are particularly vulnerable to oral diseases. Children with special health care needs are at a heightened risk for oral health problems. Factors such as other medical conditions/illnesses and access to care, that have been cited as risk factors for other populations (i.e. People with Disabilities), are applicable to children with special health care needs.

Birth Defects: Cleft Lip and Palate

The focus of this report, thus far, has been on oral diseases, however birth defects also represent a significant burden for public health efforts targeted at oral health. The Texas Birth Defects Registry reports that the number of infants who were born with a cleft lip, with or without cleft palate, was 400 cases in 2000 and 399 cases in 2001. The largest percent of infants with this birth defect were born to Hispanic women (52.2% in 2000 and 50.4% in 2001). Infants born to White mothers represented 37.2% in 2000 and 38.3% of the cases in 2001. Infants born to African American mothers represented 7.0% in 2000 and 8.3% of the cases in 2001.

Cleft palate (without cleft lip) was most prevalent among infants born to White mothers, (49.8% in 2000 and 45.6% in 2001), followed by infants born to Hispanic mothers (39.5% in 2000 and 42.4% in 2001). The percentage of infants with this condition born to African American mothers was 8.6% in 2000 and 8.8% in 2001.

Figure 10 (below) is a picture of an infant with a cleft lip and palate. Infants born with cleft palate are unable to suckle and therefore are unable to feed. These children are at an extremely high risk for starvation. Children with facial deformities are at an elevated risk for a variety of adverse social-psychological outcomes including behavior problems, poor self-concept, and parent-child relationship difficulties (Collett et al., 2006). In addition, research has shown a relationship between craniofacial disfigurement severity and incidence and frequency of victimization by peers at school (Carroll, 2005). Reconstructive surgery is required to correct the cleft lips, cleft palate, and other facial irregularities.

Figure 10: Cleft Lip and Palate



Source: Schneider's Children's Hospital; MedicalProgress.org

iv. Socioeconomic Disparities

Poor people share a disproportionate burden of oral disease and conditions. The probability of tooth decay is highest and the probability of receiving treatment is lowest for adults living below the poverty level. As a result, more poor people in America have lost all of their natural teeth compared to those people living above the poverty level (USDHHS 2000a). Regardless of age, sex, or race/ethnicity, or geographic locale, more people below the poverty level have periodontitis or serious gum disease than people above the poverty level.

Poverty, education, and oral health are connected. Poor education perpetuates poverty and is therefore related to poor oral health. Poor education means poor job prospects, which in turn means a greater probability of being poor which is associated with oral health problems. For example, a larger percentage of adults with only a high school education (28%) have gum diseases, while the percentage of those with some college with the same conditions is 15% (USDHHS, 2000b). A large percentage of people below the poverty level report lower educational attainment as well. Low educational attainment has long-range consequences from which individuals do not seem to recover. In addition, the US Department of Health and Human Services showed that 39% of persons aged 65 years and older in 1997, with less than a high school education, were toothless. For people in the same age group with some college, the percentage dropped to 13% (USDHHS, 2000b). The same age group represents 30% of those living below the poverty level. These statistics hold true throughout every state.

Oral health problems and poverty are intricately tied together: poverty puts an individual at risk for oral health problems. Oral health problems can deplete resources that could have been directed towards activities that would have improved job attainment. Many oral health problems can disfigure the mouth and distort the smile, which can affect employers' hiring decisions. Therefore, poverty is conducive to poor oral health, which increases the chances of remaining impoverished.

In the U.S., 37% of children ages two to nine years, living below the poverty level, have one or more decayed primary (baby) teeth, compared to 17% of children in the same age group, living above the poverty level (USDHHS, 2000a). Nationally, 50% of poor children aged two to eleven years have one or more untreated decayed primary teeth, compared with 31% of non-poor children (USDHHS, 2000a). The association between poverty and poor oral health is ubiquitous across all the states. Adolescents, regardless of sex or racial/ethnic group, living below the poverty level are least likely to receive treatment for decayed permanent teeth. Good oral health is important to establish in childhood. The repercussions of undiagnosed and/or untreated oral health problems endure throughout the lifespan. It is imperative that oral health efforts in every state make a preemptive strike against oral disease and help these children have brighter and more prosperous futures.

c. Societal Impact of Oral Disease

i. Social Impact

Oral health is related to well-being and quality of life as measured along functional, psychosocial, and economic dimensions. Dental diseases and disorders can interfere with the social lives of individuals. Intimate relationships may be precluded. Participation in social or community activities may be limited. The ability to secure gainful employment may also be hindered by oral and dental disease and aesthetics.

More than any other body part, the face bears the stamp of individual identity. Attractiveness has an important effect on psychological development and social relationships. Facial deformity may have adverse consequences for a person's ability to successfully function in society. Research has shown that facial deformities have a significant negative effect on perceptions of an individual's ability to function in society, including employability, honesty, and trustworthiness (Rankin, 2003). Most psychological research on the social effects of facial appearance has concluded that people with facial deformities such as cleft lips, port wine stains, severe tooth loss, and gum disease suffer negative reactions from other people. Negative perceptions of patients with facial deformities occur regardless of sex, educational level, and age of evaluator (Rankin, 2003).

Impaired oral and craniofacial health can affect diet, nutrition, sleep, psychological balance, social interaction, academic performance, and work. Oral condition has been shown to affect oral function, self-confidence, orally related activity, emotions, social functioning, general health and/or life in general (Nuttall, 2006).

Oral and craniofacial diseases and conditions compromise the ability to bite, chew, and swallow foods. They limit food selection and thereby contribute to poor nutrition (Sahyoun, 2004). These conditions include tooth loss, diminished salivary functions, oral-facial pain conditions such as temporomandibular disorders, alterations in taste, and functional limitations of prosthetic replacements. Oral-facial pain, as a symptom of untreated dental and oral problems and as a condition in and of itself, is a major source of diminished quality of life. Oral pain is associated with sleep deprivation, depression, and multiple adverse psychosocial outcomes (Finn and Wolpin, 2005).

The mouth and teeth are integral to effective communication. Diseases and conditions that disrupt verbal and nonverbal communication are likely to damage self-image and alter the ability to sustain and build social relationships. Perhaps due to social embarrassment or functional problems, people with oral conditions may avoid conversation or laughing, smiling, or other nonverbal expressions that show their mouths and teeth.

Oral diseases have a particularly immense impact on the oral, general, and reproductive health of women, quality of their lives, and the oral health of their children. And while the effects on physical health are substantial, the consequences of oral diseases are also psychological, social, and economic, often resulting in diminished self-image, social isolation, and days lost from work or school (US DHHS, Oral Health in America 2000).

ii. Economic Impact

Direct Costs of Oral Diseases

Expenditures for dental services in the United States in 2003 were \$74.3 billion, 4.4% of the total spent on health care that year (Centers for Medicare & Medicaid Services, 2004).

A large proportion of dental care is paid out-of-pocket by patients. Nationally in 2003, 44% of dental care was paid out-of-pocket, 49% was paid by private dental insurance, and 7% was paid by federal or state government sources. In comparison, 10% of physician and clinical services were paid out-of-pocket, 50% were covered by private medical insurance, and 33% were paid by government sources (Centers for Medicare & Medicaid Services, 2005).

Table 6 (below) shows that in 2006, Texas Health Step (THSteps) spent an estimated \$296,876,648 on dental services and through NON-Children's Health Insurance Program (CHIP) Phase I of which \$72,797,672 were for orthodontia. The average cost per dental client was \$144.60 or \$12.05 per each recipient month. Over the past six years CSHCN provided dental and orthodontia service to eligible clients; the majority of these services were dental. The average cost for dental services for a CSHCN patient ranged from \$267.90 in 1999 to \$249.09 in 2002. The total number of clients who received dental and orthodontia services has declined from 505 in 1999 to 270 in 2001 and 192 in 2002.

Table 6: Texas DSHS Oral Health Expenditures FY 02 to FY 06					
Program	FY 02	FY 03	FY04	FY05	FY06
Texas DSHS Oral Health Program	\$2,738,903	\$2,373,338	\$906,509	\$608,327	\$921,491
Community Fluoridation	\$679,471	\$336,773	\$246,526	\$266,423	\$141,044
THSteps Dental NON -CHIP Phase I	\$178,300,531	\$246,606,848	\$281,837,577	\$304,438,923	\$296,876,648
THSteps Dental CHIP Phase I	\$932,112	27676*****	NA	NA	NA
THSteps Orthodontia NON -CHIP Phase I	\$14,175,443	\$21,980,366	\$34,627,486	\$53,089,097	\$72,797,672
THSteps Orthodontia CHIP Phase I	\$107,511	\$2,831*****	NA	NA	NA

*Excluding Fluoridation

***** Projected

***** Recipient months = 1,701

Data source: HHSC System Forecasting and DSHS Budget Revenue (April 2007)

Indirect Costs of Oral Diseases

Oral and craniofacial diseases and their treatment place a burden on society in the form of lost days and years of productive work. Acute dental conditions were responsible for more than 2.4 million days of work loss and contributed to a range of problems for employed adults, including restricted activity and bed days. In addition, conditions such as oral and pharyngeal cancers contribute to premature death and can be measured by years of life lost. In 1996, the most recent year for which national data are available, U.S. schoolchildren missed a total of 1.6 million days of school because of acute dental conditions, which is more than 3 days for every 100 students (USDHHS, 2000a).

iii. Oral Disease and Other Health Conditions

Oral health and general health are integral to each other. Many systemic diseases and conditions including diabetes, HIV, and nutritional deficiencies, have oral signs and symptoms, these manifestations may be the initial sign of clinical disease. These indicators can serve to inform health care providers and individuals of the need for further assessment. The oral cavity is a portal of entry as well as the site of disease for bacterial and viral infections that affect general health status.

Recent research suggests that inflammation associated with periodontitis may increase the risk of heart disease and stroke, premature births in some females, trouble in controlling blood sugar in persons with diabetes, and respiratory infection in vulnerable individuals (Dasanayake, 1998; Offenbacher et al., 2001; Davenport et al., 1998; Beck et al., 1998; Scannapieco et al., 2003; Taylor, 2001). More research is needed in these areas. Oral diseases and conditions are not only markers for underlying health problems, but also important determinants influencing the development and management of adverse chronic health conditions such as cardiovascular disease and diabetes (Steinberg, 1999). In addition, research provides evidence that poor maternal oral health status contributes to the incidence of pre-term birth and low birth weight (Offenbacher, 1996; Jeffcoat, 2001) and increases the risk of early childhood caries among offspring (Caufield, 2000).

V. RISK AND PROTECTIVE FACTORS AFFECTING ORAL DISEASES

Safe and effective measures are available to reduce the incidence of oral disease, reduce disparities, and increase quality of life. The Surgeon General's landmark report on oral health stresses the important connection between oral health and general health and well-being. According to the report, the mouth can function as an "early warning" system for some diseases, and can provide a useful means to understanding organs and systems in other parts of the body (USDHHS, 2000). Several signs and symptoms of disease, lifestyle behaviors, and exposure to toxins can be detected in and around the craniofacial complex. Further, the early identification of oral disease may contribute to the early diagnosis and treatment for a number of systemic diseases such as diabetes, cardiovascular disease, osteoporosis, and obesity (USDHHS, 2000a).

Preventive and control programs need to be given high priority in order to minimize the need for curative, restorative, and therapeutic management of oral diseases. This section provides information on the oral health interventions in Texas. Effectiveness of these interventions has been shown through evidence-based research.

The CDC task force on community preventive services combined the best available studies of community water fluoridation and school sealant programs to inform a broad public health audience that these interventions are among the most effective means available to prevent tooth decay (CDC MMWR, 2001). These strategies are particularly useful for reaching entire communities, but especially groups at high risk for decay, and they are essential to achieving the national objectives put forth by Healthy People.

"Communities should use these findings to support their local planning processes; if local goals and resources permit, use of these interventions should be initiated or increased," said Dr. William R. Maas, director of CDC's oral health program based on the task force report's conclusions. In addition, a long-term oral health strategy must focus on prevention (Brocato, 2001).

a. Community Water Fluoridation

Over the past 50 years, the damage caused by dental decay has been drastically reduced, primarily with fluoride. The most effective way to deliver the benefits of fluoride to all residents of a community is water fluoridation. It prevents cavities and saves money, both for families and the health care system.

By adjusting the natural fluoride concentration of a community's water supply, community water fluoridation has been very successful in lowering the differential prevalence of tooth decay among different socioeconomic, racial, and ethnic groups. Fluoridation as a prevention method is effective, safe, inexpensive, requires no behavioral change by individuals, and does not depend on access or availability of professional services. Fluoridation helps to lower the cost of dental care and dental insurance. It is recognized as an effective measure in maintaining dental health and reducing tooth loss (USDHHS, 2000a). In the United States, community water fluoridation has been the basis for the primary prevention of dental caries for over 60 years. Fluoridation has been recognized as one of the 10 great achievements in public health in the 20th Century (CDC, 1999).

HP 2010 recognizes the importance of community water fluoridation. Objective 21-9 intends to "Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water to 75%." In 2002, approximately 162 million people in the United States (67% of the population served by public water systems) received optimally fluoridated water (CDC, 2004).

Not only does community water fluoridation effectively prevent dental caries, it also offers significant cost savings to almost all communities (Griffin et al., 2001): one of very few public health prevention measures that does. It has been estimated that every \$1 invested in community water fluoridation saves approximately \$38 in averted costs for communities with more than 20,000 residents. The cost per person of instituting and maintaining a water fluoridation program in a community decreases with increasing population size (CDC MMWR, 2001). The Task Force on Community Preventive Services strongly recommends community water fluoridation.

In 1999, an estimated \$56 billion was spent on dental services, representing about 5.6% of all expenditures for personal health care in the United States. The national average cost to restore one cavity with dental amalgam is approximately \$65—the approximate cost of providing fluoridation to an individual for a lifetime. In Texas, the impact of fluoridation programs has also proven substantial in terms of health care savings.

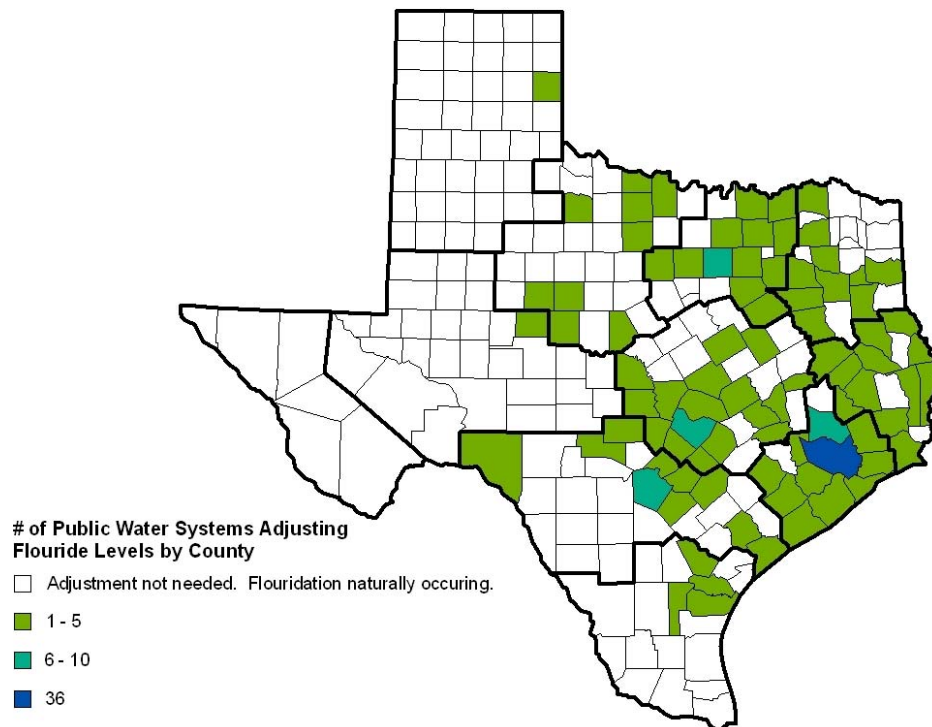
Recent studies show that water fluoridation will reduce dental caries in permanent teeth by approximately 18 to 40%. Although this reduction in decay is not as dramatic as it was in the 1950s and 1960s, it is significant when compared to tooth decay in non-fluoridated communities (CDC, Website, 2006). In 2004, approximately 16.4 million Texans or 76.6% of the population served by public water systems received fluoridated water (CDC, WFRS Report, 2006).

The average claim per treated child paid to dentists under Texas Health Steps decreased by \$35.00 each year from 1997 to 2004, as the unit level of water fluoride rose.

In 1997, the DSHS Oral Health Program conducted a study to assess the preventive cost of community fluoridation on the average Medicaid cost per child ages one through 20, who received dental care under the Texas Health Steps (EPSDT – Medicaid Program). The study concluded that an average reduction of \$19 in dental care costs per child could be realized provided communities maintained optimal water fluoridation levels (0.8-1.2mg/l). The Texas Fluoridation Program monitors fluoridation levels in communities and promotes the benefits of fluoridation.

Figure 11 is a map showing the community water fluoridation systems of Texas.

**Figure 11: Texas
Community
Water
Fluoridation
Systems**



b. Topical Fluorides and Fluoride Supplements

All people should drink water with an optimal fluoride concentration and brush their teeth twice daily with fluoride toothpaste (CDC, 2001). Frequent exposure to small amounts of fluoride each day most effectively reduces the risk for dental caries. People living in communities that do not receive fluoridated water and persons at high risk for dental caries may need supplemental fluoride. In Texas, community measures include fluoride mouth rinse or tablet programs, which are typically carried out in schools. For persons at high risk for caries, supplemental fluoride measures include professionally applied topical fluoride gels or rinses.

The Texas DSHS OHP is also utilizing other fluoride delivery mechanisms. Fluoride varnish is painted onto teeth and forms an extra barrier against tooth decay. Varnished teeth resist decay by attacking the bacteria that cause cavities. Varnishes contain fluoride for better protection against tooth decay (Higbee, 1994). Currently varnishes are routinely used to reduce sensitivity from root exposure and are being used to prevent dental caries. Topical fluoride varnishes have been widely used as an operator-applied caries-preventive intervention for over two decades (Marinho et al, 2002). While the effectiveness of caries prevention of all topical fluoride treatments is similar, fluoride varnishes hold certain advantages that make them ideal for public health efforts.

The impact of varnish use is potentially very wide. First, the application is quick. No special equipment is needed. Varnish contains higher concentrations of fluoride. Small amounts of the compound are used for a treatment (ADA, 2006). The semi-permanence of the varnish means that the substance stays on the teeth long enough to be effective (slow release): a weakness noted in other topical fluoride treatments (Higbee, 1994). Varnishes hardened very quickly, so there is less chance that the patient will ingest the substance (ADA, 2006). A substantial body of evidence supports the use of varnishes in the prevention of tooth decay for children and adolescents.

Implications of Topical Fluorides for Public Health:

These advantages make fluoride varnish ideal for public health efforts. The ease of application means other healthcare professionals can apply the compound to the teeth. The application also takes little time; so that the treatment can be incorporated into other health visits. A nurse or physician's assistant could apply the varnish as part of a routine health exam. No special equipment is needed to apply varnish, making this treatment extremely portable. Fluoride varnish, then, becomes an ideal prevention method for populations who live in remote areas (i.e. rural areas with no community water fluoridation system). The fluoride concentration is twice that of fluoride gels, but the amount of varnish needed per treatment is ten times less than that of fluoride gels, making varnish an extremely cost effective choice (ADA, 2006).

Varnishes also allow for the slow release of fluoride over time, meaning the teeth are protected longer than by other methods. Varnish is a viable alternative prevention method for populations for whom the other fluoride treatments might be a challenge. Since they harden almost instantaneously, ingestion is less likely. This alone makes it advantageous for children. People who find brushing difficult or who lack the mental capacity to maintain oral hygiene are ideal candidates for fluoride varnishes. A substantial body of research supports their use among children, adolescents, and other populations (ADA, 2006). The DSHS OHP is committed to the effective delivery and the promotion of effective prevention of tooth caries. Varnishes may be a method that the dental health services in Texas come to rely on as a part of the preventive services made available to low-income children.

c. Dental Sealants

Dental sealants are a safe and effective way to prevent cavities among schoolchildren, and in some cases, sealants can arrest incipient tooth decay in the early development stage. The procedure is cost-effective, easily applied, and a barrier from cavity-causing bacteria. Since the early 1970s, the widespread exposure to fluorides has decreased childhood dental caries on smooth tooth surfaces (those without pits and fissures). Among children, 90% of decay occurs in pits and fissures. The molar teeth are particularly vulnerable. Over 80% of tooth decay in school children is on chewing surfaces of teeth that could be protected by dental sealants, but only 19% of children and adolescents nationwide have at least one sealed permanent tooth (NCEMCH, 1999).

The Food and Drug Administration (FDA) has approved the use of pit and fissure sealants for the prevention of dental caries for many years. These coatings are bonded to susceptible tooth surfaces to protect them from decay. First permanent molars erupt into the mouth at about age six years. Placing sealants on these teeth shortly after their eruption, protects them from the development of caries in areas of the teeth where food may more easily become lodged and cause bacteria to grow. Professional health associations and public health agencies recommend the use of dental sealants to prevent tooth decay. If sealants were applied routinely to susceptible tooth surfaces in conjunction with the appropriate use of fluoride, most tooth decay in children could be avoided (USDHHS, 2000b).

Second permanent molars are also vulnerable to tooth decay. These teeth erupt into the mouth at about age twelve to thirteen years. Dental professionals also recommend that young teenagers receive dental sealants shortly after the eruption of their second permanent molars.

According to CDC, in examining the effectiveness of school-based or school-linked dental sealant programs, there was typically a 60% decrease in new decayed pit and fissure surfaces for up to two to five years after a single sealant application.

School-based and linked programs in the U.S. generally target vulnerable populations less likely to receive private dental care such as children eligible for free and reduced lunch programs (CDC MMWR, 2001). Thus, school-based dental sealant programs can increase the prevalence of dental sealants and reduce or eliminate racial and income disparities among children with sealants (CDC MMWR, 2001).

The *HP 2010* target for dental sealants on molars is 50% for eight year olds and fourteen year olds. Nationally, dental sealants are less prevalent among fourteen years olds than among eight year olds. The prevalence of sealants within these age groups varies by race/ethnicity and educational level of the head of household. For example, African Americans and Hispanic children and adolescents are less likely than White children/adolescents to have received dental sealants. The prevalence of sealants also varies by the education level of the parents/guardian. As the educational level of the head of household increases, so to does the likelihood that the child has received dental sealants decreases

In order to reach this goal, Texas DSHS is assessing the prevalence of sealants among the population of third grade children in Texas public schools. From August 2004 through May 2006, DSHS regional-based dental staff screened a sample of third grade children statewide. The current Texas BSS data show that the staff provided sealants to approximately 2000 of these third graders. The total number of children with previously sealed teeth was approximately 2000 children, meaning that 35% of third grade children in Texas who were part of BSS data collection had dental sealants on molar teeth (DSHS, BSS, 2006). Table 7 (below) reports the prevalence of dental sealants among Texas 3rd graders from the current BSS data as of December 2006. National averages and HP 2010 targets are included for comparison.

Table 7. Percentage of Children with Dental Sealants on Molar Teeth: United States and Texas

	United States, (8-year-olds)* (%)	Texas, 3 rd graders ^d (%)
Healthy People 2010 Target	50	50
TOTAL	28	37
Race or ethnicity		
American Indian or Alaska Native	63^a	26
Asian	DNC	25
Black or African American	11^c	31
White	26^c	35
Hispanic or Latino	DSU	40
Sex		
Female	31	23
Male	25	24
Select Populations		
3rd grade students	26^c	23%^{**}

Table 7 Sources: *Healthy People 2010, Progress Review, 2000*. U.S. Department of Health and Human Services. Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls.

<These data will be updated in 2006.>

--- = Data not available DNA = Data not analyzed

DNC = Data not collected DSU = Data are statistically unreliable or do not meet criteria for confidentiality

NA = Not applicable *National data are from NHANES 1999–2000 unless otherwise indicated.

^a Data are for IHS service areas, 1999.

^b Data are for Hawaii, 1999.

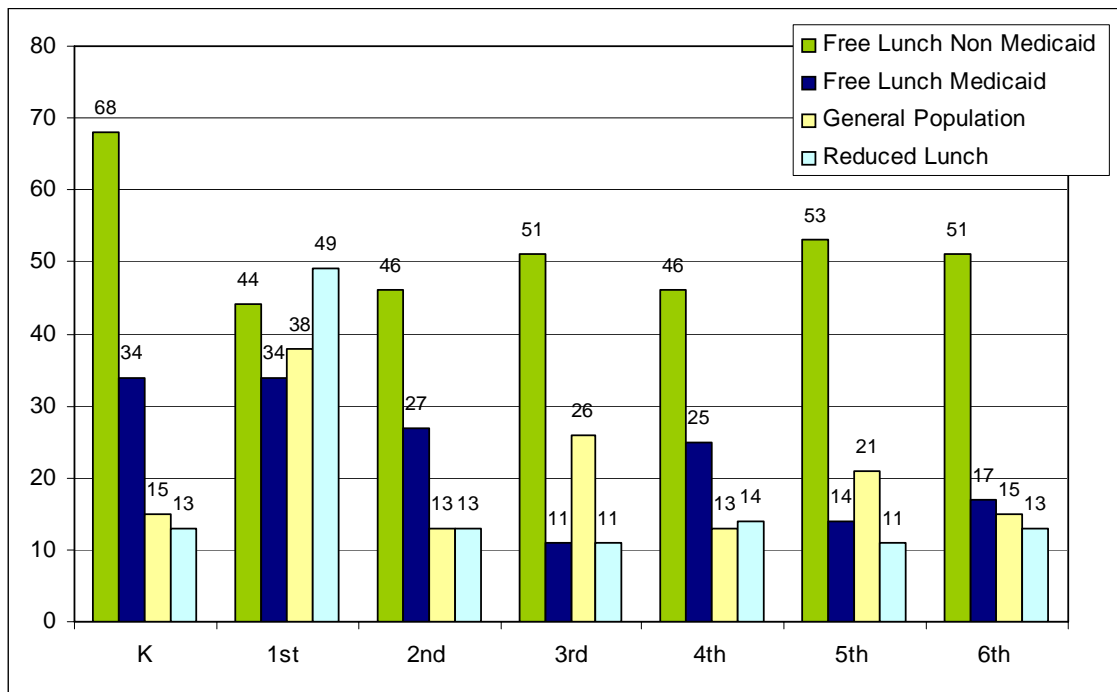
^c Data are from NHANES III, 1988–1994.^d

Texas Data Source: Basic Screening Survey 2006.

Estimates weighted by age, race/ethnicity, and probability of being chosen.

From 1997-2001, the Texas DSHS Oral Health Program collected data on the prevalence of oral disease in children through surveillance data collected within the public school system in coordination with school-based dental sealant projects. In the children screened, Medicaid eligibility was not consistently associated with overall caries experience (Figure 12).

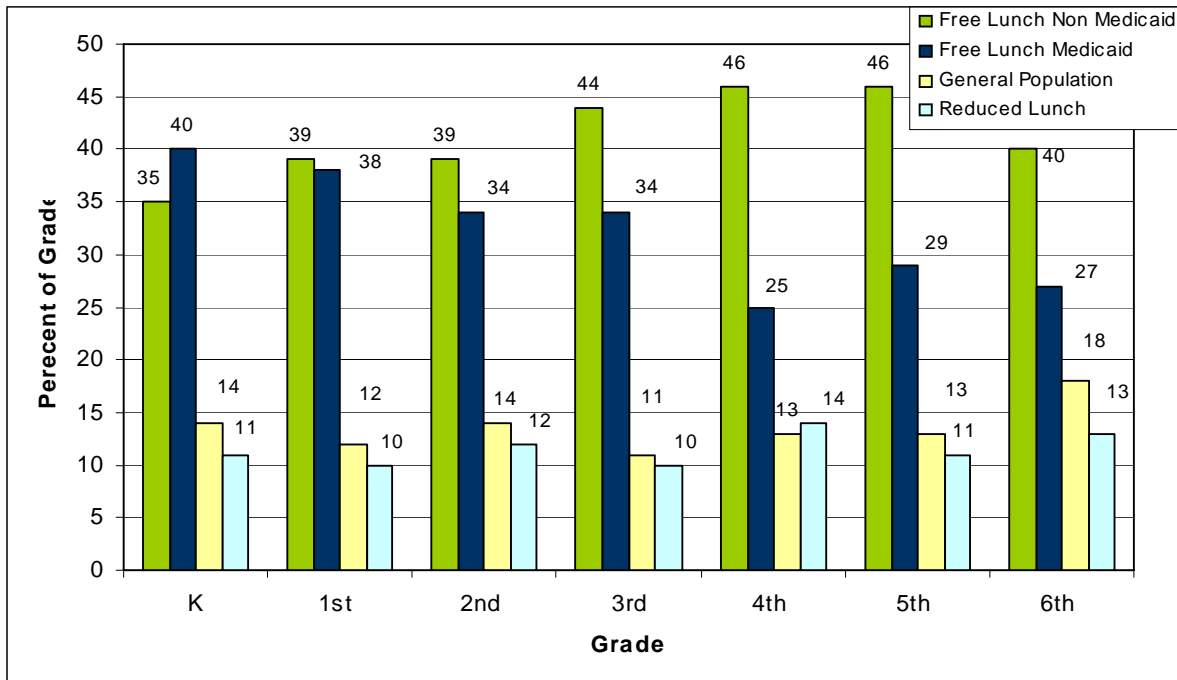
Figure 12: Untreated Decay by Medicaid Status and Grade



Data Source: Basic Screening Survey, 2005-2006 (n=17,131)

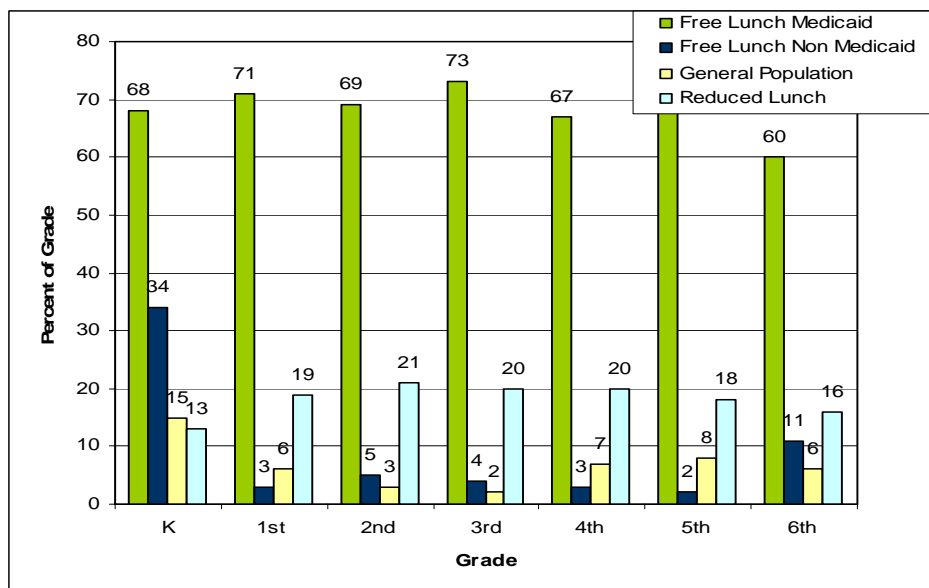
Medicaid eligibility, however, was associated with both the prevalence of untreated decay and dental sealants. A higher proportion of children not eligible for Medicaid had untreated decay while a lower proportion had dental sealants (Figures 13 & 14). This suggests that low-income children without Medicaid have a more difficult time accessing dental care compared to low-income children with Medicaid.

Figure 13: Caries Experience by Medicaid Status and Grade



Data Source: Basic Screening Survey, 2005-2006 (n=17,131)

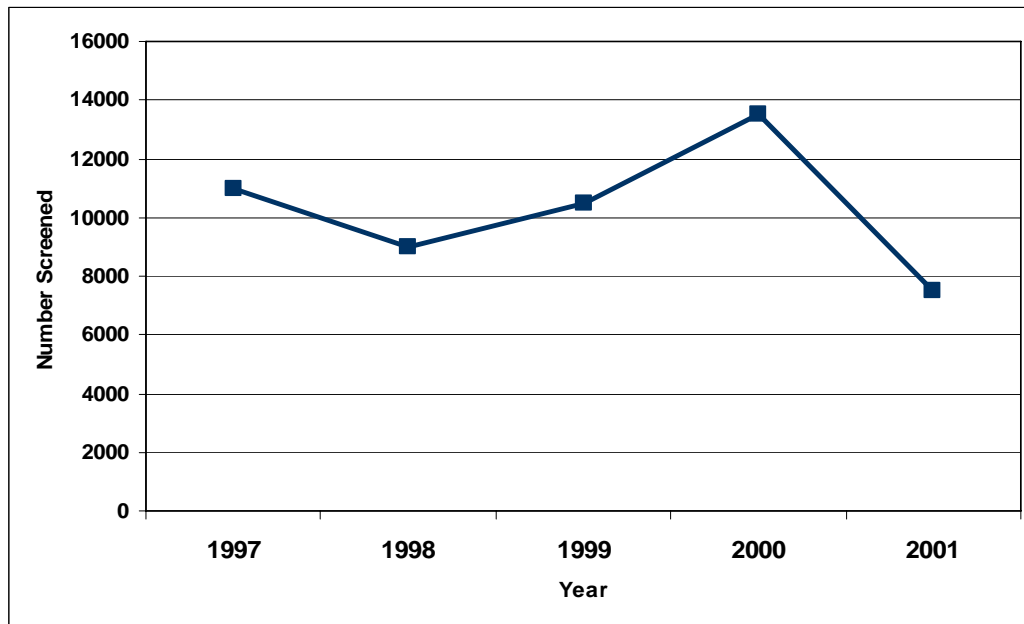
Figure 14: Dental Sealants by Medicaid Status and Grade



Data Source: Basic Screening Survey, 2005-2006 (n=17,131)

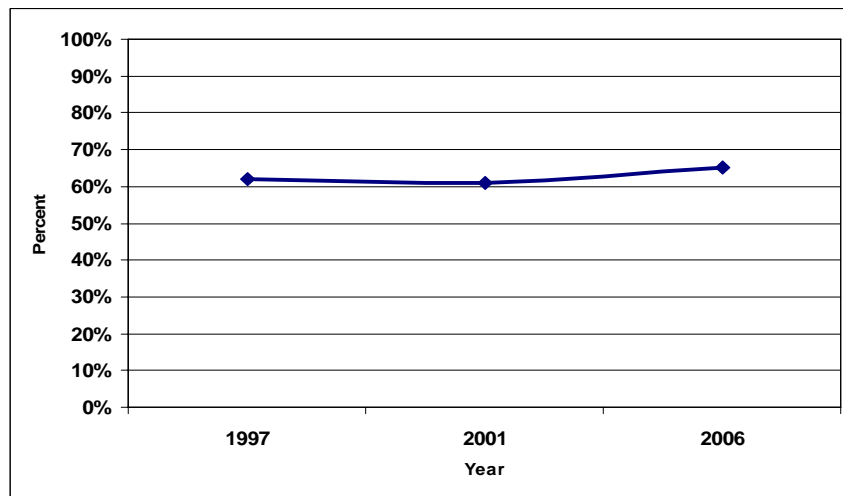
Figures 15 through 18 show the Texas trends on the prevalence of oral disease on Non-Medicaid eligible children screened by the Texas DSHS Oral Health Regional Staff from 1997-2001.

Figure 15: Number of Non-Medicaid Children Screened



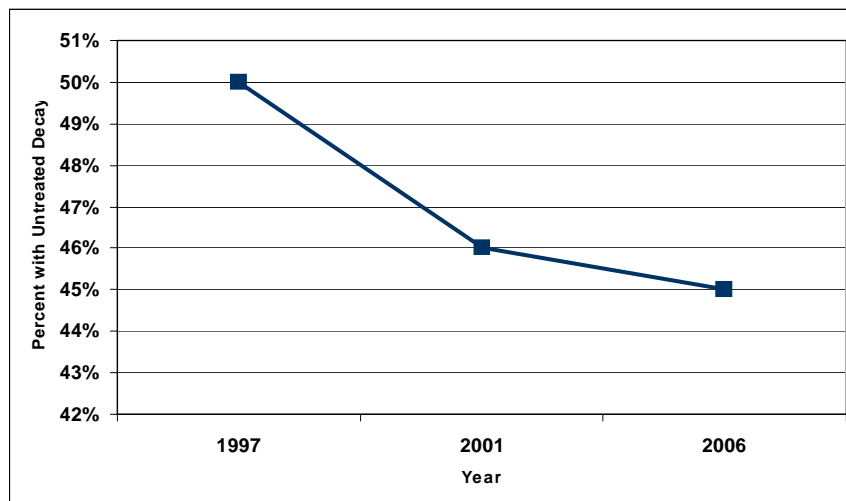
Data Source: Expenditure Data THSteps FY 97 to 01, Basic Screening Survey, 2005-2006 (n=17,131)

Figure 16: Percentage of Non-Medicaid Children with Caries Past or Present



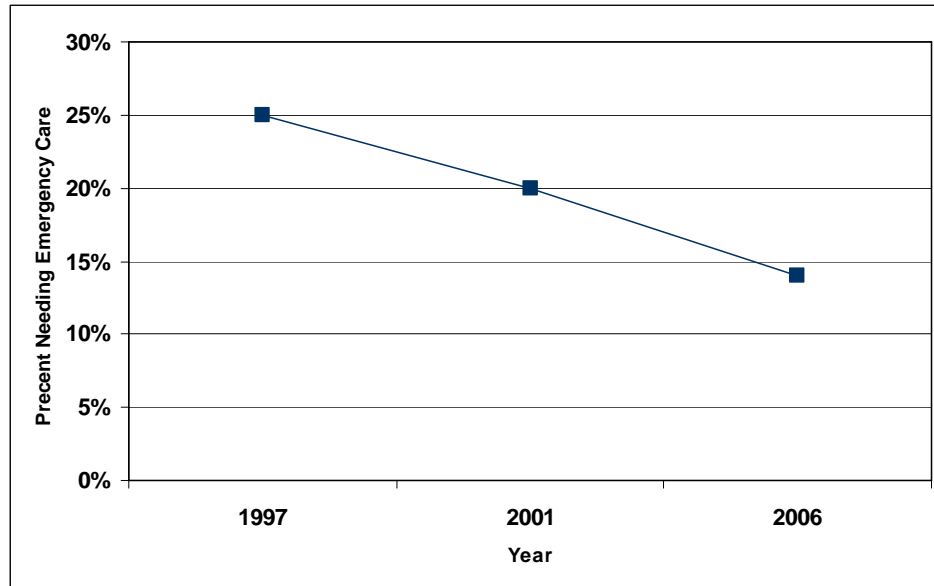
Data Source: Expenditure Data THSteps FY 97 to 01, Basic Screening Survey, 2005-2006 (n=17,131)

Figure 17: Percentage of Non-Medicaid Children with Oral Untreated Caries Present



Data Source: Expenditure Data THSteps FY 97 to 01, Basic Screening Survey, 2005-2006 (n=17,131)

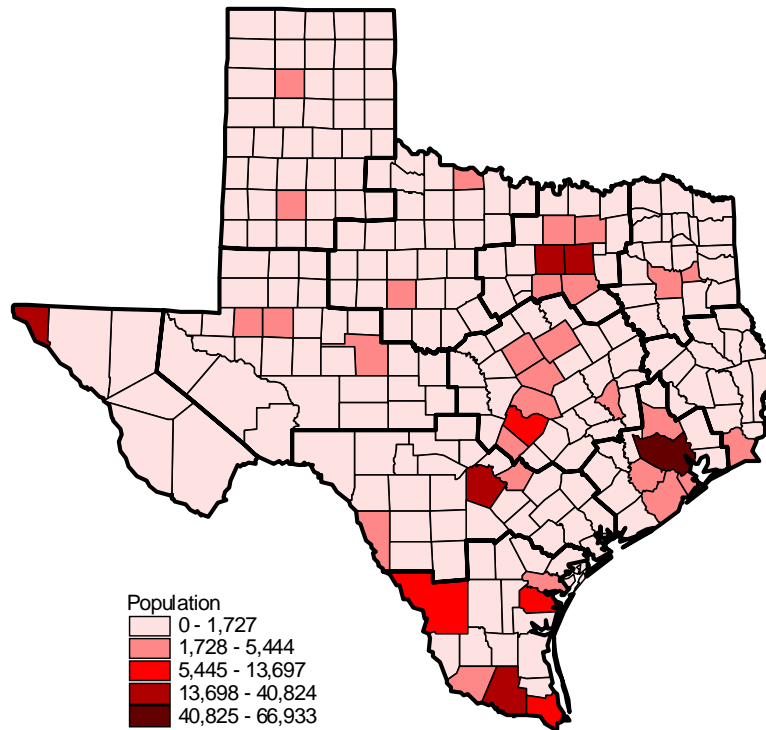
Figure 18: Percentage of Non-Medicaid Children who need Emergency Care for Pain or Abscess



Data Source: Expenditure Data THSteps FY97 to 01, Basic Screening Survey, 2005-2006 (n=17,313)

The population of children age 6-8 eligible to receive services based on 185% of the Federal Poverty Level (FPL) is represented in Figure 19.

Figure 19:
Distribution of
Eligible Children
Ages 6-8 at 185%
FPL.



d. Preventive Visits

To maintain good oral health, individuals, caregivers, and healthcare providers must be vigilant. Daily oral hygiene routines and healthy lifestyle behaviors, which include professional teeth cleaning, are important in oral disease prevention. Regular preventive dental care can reduce the development of disease and facilitate early diagnosis and treatment. A review of the BRFSS shows that a majority of Texans engage in behaviors related to good oral health.

The American Academy of Pediatric Dentistry (AAPD) recommends a dental check-up at least twice a year for most children. Some children need dental visits more frequently because of increased risk of tooth decay, unusual growth patterns or poor oral hygiene. According to the AAPD: Regular dental visits help a child stay cavity-free, regular cleanings remove debris that build up on the teeth, irritate the gums, and cause decay, fluoride treatments renew the fluoride content in the enamel, strengthening teeth and preventing cavities, and hygiene instructions improve a child's brushing and flossing,

leading to cleaner teeth and healthier gums. Tooth decay is not the only reason for a dental visit. For example, a child may need additional fluoride, dietary changes, or sealants for ideal oral health. In addition, the pediatric dentist may identify orthodontic problems and suggest treatment to guide the teeth as they erupt in the mouth.

e. Cleanings

Based on existing literature, efficient oral hygiene was found to have a caries preventive effect (Bellini et al., 1981). The quality of the cleaning appears to be more important than the frequency of its performance. Professional cleaning at regular intervals may inhibit caries on all tooth surfaces. The effect of self-performed oral hygiene has been demonstrated mainly on smooth surfaces and on front teeth (Bellini et al., 1981).

Each year the BRFSS asks different questions regarding approximately 40 risk and health behaviors. One measure of preventive care that is being tracked, as shown in Table 8, is the percentage of adults who had their teeth cleaned in the past year. Having one's teeth cleaned by a dentist or dental hygienist is indicative of preventive behaviors. In 2002, 60% of Texans who responded to the BRFSS reported they had received a professional cleaning in the past 12 months. In 2004, 59% of Texas survey respondents reported visiting a dentist or dental clinic, including specialists or orthodontists within the past year.

A review of recent dental visits by race/ethnicity (see Table 8, below) shows that in Texas 64.5% of White, 50.4% of African American, and 49.5% of Hispanic people have visited a dentist in the past year. These percentages represent a slight decrease from the 1999 data for the White and African American respondents. The table also shows that the percentage of Hispanic people who had received dental care in the past year rose by 3% by 2004 from 45.4% in 1999. However, that is a slight drop from 51.6% in 2002.

Table 8. Percentage of Adults Aged 18 or Older Who Had Their Teeth Cleaned Within the Past Year, 2004

	US (%) (median)	Texas ^a (%)
Total	69	58.7
Age		
18 – 24 years	66.2	56.9
25 – 34 years	64	54.8
35 – 44 years	68.2	55.4
45 – 54 years	71	62.2
55 – 64 years	73	61.6
65 + years	73	65
Race		
White	72.5	64.5
Black	59.7	50.4
Hispanic	60.3	49.5
Other	66.8	63.4
Multiracial	57.1	DNC
Sex		
Male	66.4	58.5
Female	71.4	58.9
Education Level		
Less than high school	49	41
High school or G.E.D.	63.7	52.9
Some post high school	70.2	59.1
College graduate	79.2	72.5
Income		
Less than \$15,000	49.9	42.1
\$15,000 – 24,999	55	44.4
\$25,000 – 34,999	64.1	56.8
\$35,000 – 49,999	69.8	60.9
\$50,000+	80.5	73.1

Table 8 Sources:

Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, *Behavioral Risk Factor Surveillance System Online Prevalence Data*, 1995–2004.

Available at www.cdc.gov/brfss.

^a Texas Data Source(s): Division of Adult and Community Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, *Behavioral Risk Factor Surveillance System Online Prevalence Data*, 1995–2004.

Available at www.cdc.gov/brfss

f. Screening for Oral Cancer

Oral cancer detection is accomplished by a thorough examination of the head and neck, an examination of the mouth including the tongue, the entire oro-pharyngeal mucosal tissues, and the lips, and palpation of the lymph nodes. Although the sensitivity and specificity of the oral cancer examination have not been established in clinical studies, most experts consider early detection and treatment of precancerous lesions and diagnosis of oral cancer at localized stages to be the major approaches for secondary prevention of these cancers (Silverman, 1998; Johnson, 1999; CDC, 1998). If suspicious tissues are detected during an examination, definitive diagnostic tests, such as biopsies, are needed to make a firm diagnosis.

Oral cancer is more common after the age of 60 years. Known risk factors include use of tobacco products and alcohol. Nationally, the risk of oral cancer is increased six to 28 times in current smokers. Alcohol consumption is an independent risk factor and, when combined with the use of tobacco products, accounts for most cases of oral cancer in the United States and elsewhere (USDHHS, 2004a).

Table 9. Proportion^a of Adults in the United States Who Were Examined for Oral and Pharyngeal Cancer in the Preceding 12 Months and Expected New Cases in Texas 2004-2006

Adults Aged 40 Years and Older	Cancer Examination in Past 12 Months US (1998) (%)	Texas ^c Expected New Cases		
		2004	2005	2006
Healthy People 2010 Target	20	***	20	***
TOTAL	13	2136	2194	2250
Sex				
Female	14	683	698	712
Male	12 ^b	1453	1496	1537

Table 9 Sources:

Healthy People 2010, Progress Review, 2000. U.S. Department of Health and Human Services.

Available at www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls. <These data will be updated in 2006.>

DNC = Data not collected DSU = Data are statistically unreliable or do not meet criteria for confidentiality

^a Age adjusted to the year 2000 standard population.

^b Persons reported only one race or reported more than one race and identified one race as best representing their race. ^c Texas

Data Source: Cancer and Epidemiology Surveillance Branch, Texas DSHS January 2006

Individuals should also be advised to avoid other potential carcinogens, such as exposure to sunlight (a risk factor for lip cancer), and use lip sunscreen as well as hats.

Recognizing the need for dental and medical providers to examine adults for oral and pharyngeal cancer, *HP 2010* Objective 21-7 is to increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers. Nationally, relatively few adults aged 40 years and older (13%) reported receiving an examination for oral and pharyngeal cancer, although the proportion varied by race/ethnicity (Table 9). No state data has been collected as of yet. However, projections by the Cancer Registry suggest that approximately 2,200 new cases of oral cancer will be diagnosed in Texas during 2006.

g. Tobacco Control

More than 400,000 Americans die each year as a direct result of cigarette smoking. Tobacco related illness is the nation's leading preventable cause of premature mortality. Annually, smoking causes over \$150 billion in economic losses (MMWR, 2002).

The use of tobacco has been established as a major cause of oral and pharyngeal cancer (USDHHS, 2004a). The evidence shows that smoking is a determinant of adult periodontitis (USDHHS, 2004a). Over 50% of the cases of periodontal disease in the United States may be attributable to cigarette smoking (Tomar & Asma, 2000). Tobacco use substantially reduces the effectiveness of periodontal therapy and dental implants. It inhibits oral wound healing and increases the risk for a wide range of oral soft tissue changes (Christen et al., 1991; AAP, 1999).

Research has demonstrated that smokers have seven times the risk of developing gum disease compared to non-smokers, and that tobacco use in any form—cigarette, pipes, and smokeless tobacco—is a risk factor for oral and throat cancer, gum disease, periodontal diseases, oral fungal infection, impaired healing after periodontal treatment, gingival recession, and coronal and root caries (OSG DHHS CDC, 2000).

In addition, young children who are exposed to secondhand smoke have a much higher rate of tooth decay than children who do not grow up around smokers, according to a study supported by the Agency for Healthcare Research and Quality (AHRQ). The study, "Environmental Tobacco Smoke and Risk of Caries", which included approximately 4,000 children ages four to 11 years of age, links secondhand smoke to tooth decay in children. The study found that children had an increased risk of tooth decay if they had high levels of cotinine, a by-product of nicotine that is consistent with secondhand smoke exposure (AHRQ JAMA, 2003). These results provide further evidence that passive smoking is harmful and that all children should be allowed to grow up in a smoke-free environment. Texas DSHS is involved in promoting a number

of programs and policy promotions that would limit the use of tobacco products among Texas residents.

The goal of comprehensive tobacco control programs in Texas is to reduce disease, disability, and death related to tobacco use including oral diseases by:

- Preventing the initiation of tobacco use among young people.
- Promoting quitting among young people and adults.
- Eliminating nonsmokers' exposure to secondhand tobacco smoke.
- Identifying the differential rates of tobacco use among different groups.
- Eliminating the effects among different population groups.

Cigarette smoking among adults 18 years and older is described in Table 10. Data from the Youth Risk Behavior Surveillance System (YRBSS) on students who smoked or used other tobacco products are shown in Table 10.

Table 10. Cigarette Smoking among Adults aged 18 Years and Older		
Healthy People 2010 Target: 12%	US^a (%)	Texas^b (%)
Total	24	20
Race or Ethnicity		
Black or African American	25	23.3
White	25	21.8
Hispanic or Latino	19	16.2
Sex		
Female	22	16.9
Male	26	23.3

Table 10 Sources:

Healthy People 2010, 2nd Ed. U.S. Department of Health and Human Services, November 2000.

<These data will be updated in 2006.>

^a Age-adjusted to the Year 2000 standard population.

^b Texas Data Source: Texas Behavioral Risk Surveillance System (BRFSS) 2005.

Table 11. Percentage of Students in High School (Aged 12-21years) who Smoked Cigarettes or who Used Chewing Tobacco or Snuff One or More of the Past 30 Days

	Cigarettes US (%)	Cigarettes Texas (%)	Chew US (%)	Chew Texas a
Total	22	33.4	7	9.1
Race				
White	25	35.8	8	13
Black/African American	15	22.3	3	4
Hispanic	18	35.5	5	7
Other	18	19.7	10	DNC
Sex				
Female	22	25	2	2
Male	22	42	11	16

Table 11 Sources: Division of Adolescent and School Health, National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention, Youth Risk Behavior Surveillance System Online, Available at <http://apps.nccd.cdc.gov/yrbss/SelQuestyear.asp?cat=2&desc=Tobacco%20Use&loc=XX>.

^aTexas Data Source: Texas Youth Tobacco Survey 2001

In 2004, 20.4% of Texans smoked, this is a slight decrease from 2000 (BRFSS, 2004). Among various groups, there are also differential percentages of smoking. Men in the sample smoked more than women (23.6% vs. 17.4%). Rates of smoking were inversely related to both income and education of the respondents. For example, poorer people smoke more than wealthy people. People with low educational attainment smoke more than people with high educational attainment. The association of education and wealth hold true in every state. In Texas, smoking seems to be evenly dispersed among the different racial/ethnic population groups in the BRFSS data with 21.8% of White, 20% of African American and 18.8 % Hispanic respondents reported smoking. Tobacco control programs should use a multi-level approach in combating smoking and build coalitions with oral health promotion programs.

Dental care facilities offer an excellent location for smoking cessation efforts to meet oral health promotion. Nationally, more than 50% of adult smokers visit a dentist each year (Tomar et al., 1996), as do nearly 75% of adolescent smokers (NCHS, 2004). The statistics for Texas are assumed similar. Visible evidence of tobacco use is readily available in the patient's mouth during dental visits. Dental professionals can rely on this evidence as strong motivation for tobacco users to quit.

In Texas, the American Cancer Society (ACS) operates the smoking cessation hotline. The ACS direct phone number is 1-877-937-7848.

National and State Data on Smoking and Tobacco Use are available at:

National and state data on Behavioral Risk Factor Surveillance System (BRFSS):
<http://apps.nccd.cdc.gov/brfss/page.asp?cat=TU&yr=2004&state=US#TU>

National data on National Youth Tobacco Survey:
http://www.cdc.gov/tobacco/research_data/youth/mmwr_5412_intro.htm

National and state data on Youth Risk Behavioral Surveillance System:
<http://apps.nccd.cdc.gov/yrbss/> and
<http://apps.nccd.cdc.gov/yrbss/CategoryQuestions.asp?Cat=2&desc=Tobacco%20Use>

Other national sources include the National Health Interview Survey (NHIS):
<http://www.cdc.gov/nchs/nhis.htm>,
and the National Health and Nutrition Examination Survey (NHANES):
<http://www.cdc.gov/nchs/nhanes.htm>.

h. Oral Health Education

Oral health education for the community is a process that informs, motivates, and helps people to adopt and maintain beneficial health practices and lifestyles, advocates environmental changes as needed to facilitate this goal, and conducts professional training and research to the same end (Kressin and DeSouza, 2003). Although health information or knowledge alone does not necessarily lead to desirable health behaviors, knowledge may help empower people and communities to take action to protect their health.

The exchange of information and the opportunity to educate patients is an everyday part of dental practice. However, the amount of information that is understood and retained by patients and/or their parents is not known. There has been very little research in the area of information retention in dentistry (Thomson et al., 2001). This has implications with the demands for improved provision of information for patients.

The improvement of dental hygiene, as well as education directed at diet modifications to reduce high frequency sugar consumption and bottle-feeding during sleep are considered important measures in dental health education and oral health disease outcomes (Blinkhorn, 1998; Tinaoff et al., 2002). However, efforts in the field of both patient and public education are not supported by research.

Texas academic institutions have been at the forefront of research regarding oral health promotion. The Texas A&M Baylor College of Dentistry conducted a study addressing the readability of published dental educational materials (Alexander, 2000). Reading levels varied from third to 23rd grade (according to the Flesch-Kincaid Formula). In addition, many documents had multiple grammatical errors and words considered to be jargon or potentially obscure to lay readers. The study concluded that more attention needed to be focused on the preparation of written educational materials for dental patients to make the documents more understandable to the average patient.

The literature shows that caries and periodontitis are diseases closely correlated with oral hygiene status. The patient's understanding of oral structures and his or her interest in preserving or restoring healthy teeth and gums depends on instruction and motivation. There is, unfortunately, no scientifically based method of reliably motivating every patient. A person's ability to be motivated is substantially molded by his social position, intelligence, personality, and attitude to his body and health (Lange, 1988).

The effects of oral health education and instruction and caries prevention have been established as successful in the prevention of oral disease. Dental health professionals and stakeholders in Texas recognize the importance of oral health promotion.

i. Oral Health Coalitions

In 2004, the Texas Oral Health Coalition (TxOHC) was established to address oral health issues in the state. This coalition consists of multiple stakeholders from various entities that include: government, dental professionals, faith-based organizations, non-profit organizations, policymakers, professional education, third party payer groups, community interest groups, and the public. Its purpose is to promote optimal oral health for all Texans through statewide partnerships.

Established partnerships include, but are not limited to, the:

- Health and Human Services Commission (HHSC),
- Texas Department of State Health Services Oral Health Program (DSHS OHP)
- Texas Dental Association (TDA),
- Texas Academy of Pediatric Dentists (TAPD),
- Texas Dental Hygienists' Association (TDHA),
- Texas Dental Hygiene Educators' Association (TDHEA),
- Regional oral health coalitions,
- Texas Health Steps,
- Texas Fluoridation Project (TFP),
- Women, Infants, and Children's (WIC) Program,
- Texas Head Start State Collaboration Office,
- Maternal and Child Health (MCH) Program,
- Children with Special Health Care Needs (CSHSN) Program,
- Local Health Departments,
- School Nurses,
- School Districts,
- University of Texas Health Science Center at San Antonio, Dental and Dental Hygiene Schools,
- University of Texas Dental Branch, Houston,
- Texas A&M, Baylor College of Dentistry,
- Texas Nurses' Association,
- Faith-based organizations, and
- Community-based organizations across Texas.

TxOHC priorities include:

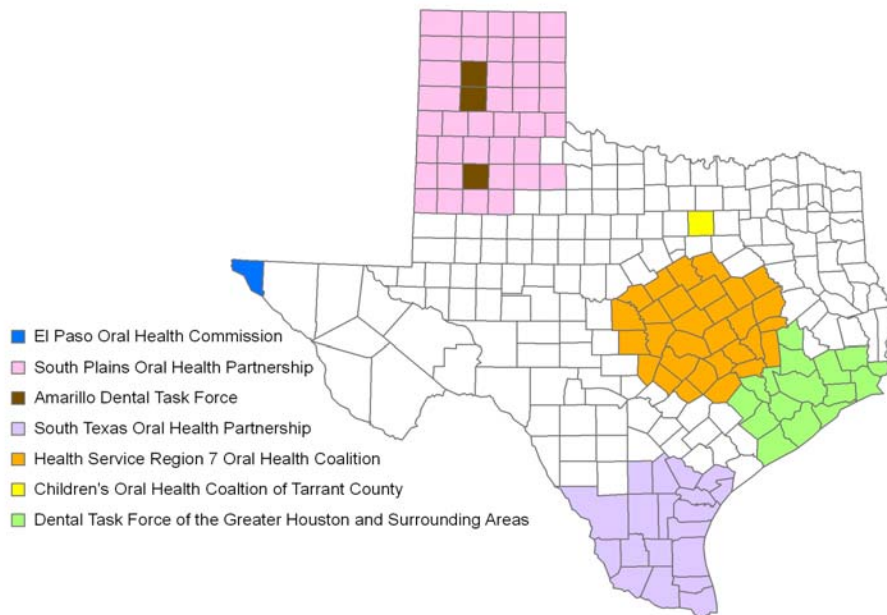
- Early education and early intervention for young children;
- Identifying oral health issues for all populations;
- Identifying opportunities, challenges, and gaps in delivery of oral health services;
- Raising awareness among legislators, the public and other groups about the need to improve oral health access;

- Developing action plans for the implementation of the state's Collaborative Oral Health Plan in Texas. <http://dental.uthscsa.edu/oralhealthsummit/>

During its first year, TxOHC successfully collaborated with child-health advocacy groups in support of legislation that restored dental benefits in the Texas Children's Health Insurance Program (CHIP). Through efforts of the coalition and its collaborative partners, dental benefits were reinstated in April 2006.

Figure 20 (below) shows the seven regional oral health coalitions in Texas: Greater Houston, Central Texas, South Plains (Lubbock), Amarillo, El Paso, Harlingen, and Tarrant County. The coalitions advocate for improved oral health services in Texas by: identifying oral health issues for all populations within Texas; reviewing, revising and implementing the Collaborative Oral Health Plan in Texas; assisting in the development of a burden document that describes the burden of oral disease in Texas; educating legislatures, stakeholders and the public about the need to improve access to oral health services; and to inform and advocate for policy issues regarding oral health. More information regarding the 2006 coalitions and the TxOHC partnership can be found at www.txohc.org.

**Figure 20:
Oral Health
Coalition
Members**



Data Source: TxOHC at www.txohc.org

VI. PROVISION OF DENTAL SERVICES

a. Dental Workforce and Capacity

Dentists, dental hygienists, and dental assistants work collaboratively to provide diagnostic, preventive, therapeutic, and orthodontic services in Texas. Effective health policies intended to expand access, improve quality, or constrain costs must consider the supply, distribution, preparation, and utilization of the available health workforce. The oral health care workforce is critical to Texans' ability to obtain high quality dental care.

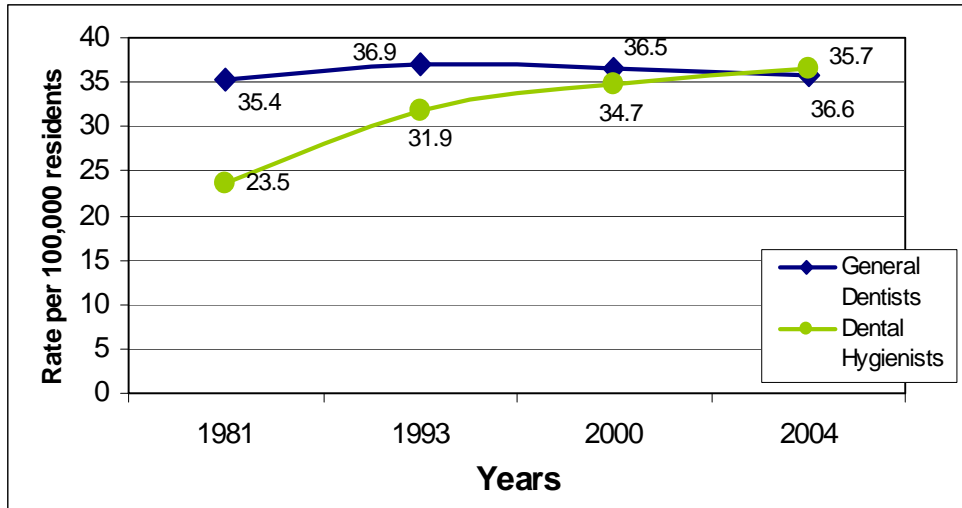
Dentists

Dentists diagnose and treat conditions that affect the mouth. Dentists may collect information for patient assessment, examine teeth and gums, perform dental cleaning, and implement procedures to prevent dental decay. Dentists may also prescribe medications, make incisions, or extract any mass related to any disease, pain, injury, deficiency, deformity, or physical condition of the mouth, including the teeth, gums, and adjacent structures. While most dentists are general dentists, some dentists specialize in certain areas of dentistry, such as orthodontia or periodontia. For the purpose of this report, the term general dentists will include dentists with the specialties of general, public health, and pediatric dentistry. In this report, statistics are reported only for dentists who are non-federal, not in a dental residency program, and who are currently licensed and practicing dentistry in Texas (SBDE, 2006).

Number of Dentists Per Capita

During the past 20 years, the number of general dentists in Texas has increased by 42% from 5,670 in 1984 to 8,057 in 2004. In 2006, the Texas State Board of Dental Examiners (TSBDE) reported 18,212 licensed dentists. Although Texas has seen an overall increase in the number of dentists, the number of dentists per capita is still lower than national numbers. From 1991 to 2000, the number of dentists grew by 28%, however the population of the state also grew during this same time by 21%. The result was a 6% growth in dentists per capita, compared to a 16% increase nationwide. In 2000, Texas had 36.5 dentists per 100,000 people. The national rate is 63.6 dentists per 100,000 people, putting Texas 39th in the nation for the number of dentists per capita. Figure 21 shows the change in the number of general dentists and dental hygienists per capita in Texas from 1981 to 2004. The overall number per capita peaked at 36.9 per 100,000 in 1993 and was 35.7 per 100,000 in 2004 (DSHS, CHSHPRC, 2005).

**Figure 21: Dentists and Dental Hygienists per capita
Texas, 1981-2004**



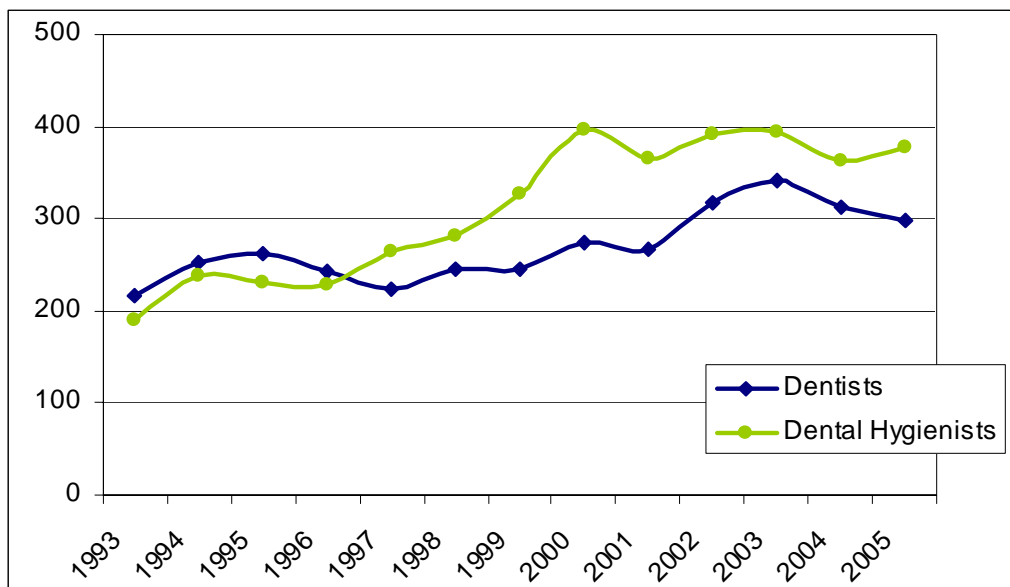
Texas Data Source: TX DSHS CHSHPRC 2005.

While the number of graduates from dental programs in the state has maintained a relatively constant increase, the demand for dental health professional exceeds the supply. Figure 22 shows that in 2005, dental hygiene graduates experienced an upturn while dental school graduates have witnessed a downturn.

Dental Hygienists

Since 1997, more dental hygienists have graduated from Texas dental hygiene programs than dentists, resulting in proportionately more licensed dental hygienists than licensed dentists in Texas. Dental hygiene, as a profession, is an ancillary service to dentistry. They are prevention specialists who, under the guidance of a licensed dentist, collect information for patient assessment, examine teeth and gums, perform dental cleaning, and apply medicines to treat dental decay. In Texas, dental hygienists are required to have graduated from a dental hygiene program accredited by the Commission on Dental Accreditation under the auspices of the American Dental Association. Dental hygienists are licensed after passing both a regional clinical board and national written board examination. The TSBDE regulates dental hygiene practitioners.

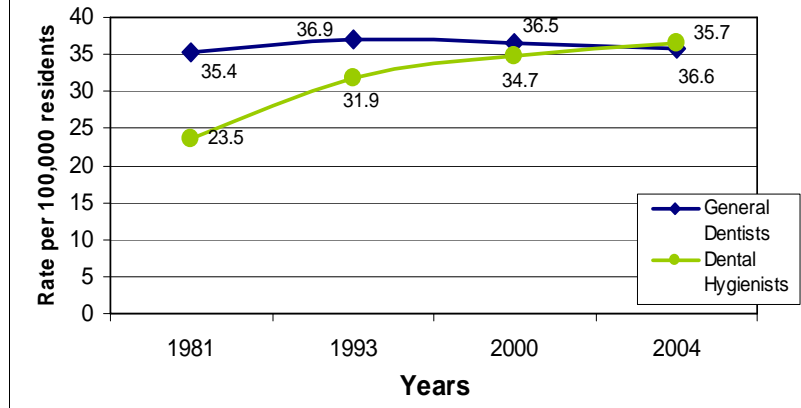
**Figure 22: Dental and Dental Hygienist Graduates
Texas, 1993-2005**



Texas Data Source: TX DSHS CHSHPRC 2005.

Number of Dental Hygienists Per Capita

The number of dental hygienists per 100,000 Texans has steadily increased since 1981. In 2006, The TSBDE reported 13,559 licensed dental hygienists. Between 1981 and 2004, the number of hygienists increased 56%. In 2004, Texas had 36.6 hygienists per 100,000 people (see Figure 22) (DSHS, CHSHPRC, 2005).



impact on the
of dentists per
al health
public health
Approximately 20%

Across the continental U.S., 186 counties have been either entirely or partially designated as Dental HPSAs. Areas with a ratio of one dentist for every 5,000 residents would meet the “dentist to population ratio” requirement as specified in the federal designation criteria eligibility for a dental HPSA. Other eligibility criteria used to establish a DHPSA include the area’s poverty and fluoridation rates. These eligibility criteria are used to determine if an area has “insufficient capacity” to meet existing needs. An area’s “insufficient capacity” is indicated by the time in advance of an appointment, number of patient visits during a full time workweek, and the number of providers not accepting new patients.

Table 12. Dentists Per 100,000 Residents by Region & HPSA Designation in Texas	
<i>Border</i>	Number Per Capita
Border	
Metropolitan	27.5
Non-Metropolitan	17.3
Non-Border	
Metropolitan	40.3
Non-Metropolitan	25.1
HPSA Designation	
Whole County	14.3
Partial County/Special Population	41.4

Texas Data Source: Hospitals with dental services. Source - TDH, AHA, THA Annual Survey of Hospitals, 2001. Head Start Programs, www.acf.hhs.gov/programs/hsb. Licensed Dentists, all active dentists. Source - State Board of Dental Examiners (SBDE) 2002. THSteps Dentists. Source - Medicaid Report HISR301A, all dentists enrolled in the THSteps program in SFY2002, by license number. Active THSteps Dentists. Source - Medicaid Report HISR301A, dentists who submitted at least 1 claim in SFY 2002, by license number. Title V Providers, county location of Title V contractor's administrative headquarters and clinics. Source - Title V FFS Provider 2002.

According to the National Health Service Corps, Texas would need an additional 784 dentists to achieve the recommended ratio of one dentist for every 3,000 residents (DSHS, Primary Care Office, 2006). Table 11 shows the distribution of dentists per

capita in border and non-border regions of Texas. The table also shows the number of dentists per 100,000 residents in locations that have been designated as either whole or partial dental HPSA.

Medicaid performing dentists account for only 23% (n=1,740) of the dental generalist workforce in Texas. The vast majority of dentists in Texas practice in urban counties. Urban dentists account for 90%, while rural dentists account for only 10% of the total workforce. Statistics from other states show similar distributions.

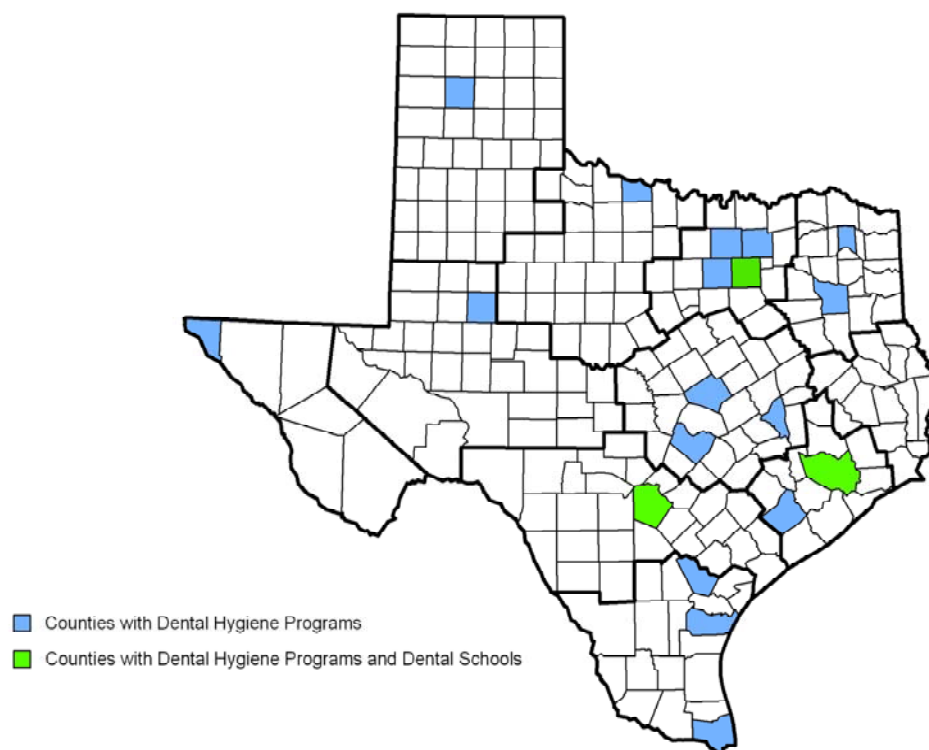
The dentist/patient ratio seen among rural dentists is lower than among urban dentists: the rural dentist/patient ratio is 1/4,029 while the urban dentist/patient ratio is 1/2,596. Therefore, low-income populations in rural areas are potentially less likely to have access to dental care than low-income populations in urban areas. Seventeen percent (n=44) of Texas counties do not have a practicing dentist available. Overall, 42% (n=107) of the Texas counties have a shortage of dental providers and have been designated by the U.S. Department of Health and Human Services (DHHS) as dental HPSAs.

In many areas of Texas, there is a shortage of dental care providers (see Table 2). A lack of practicing dentists in some areas, in combination with the small number of dentists who accept Medicaid complicate the issue of access for those who are in most need of dental care. In the state fiscal year (SFY) 2004, 2,680 or approximately 33% of the Texas' licensed dentists accepted Medicaid. Of that number, only 1,693 dentists actually provided Medicaid services. In SFY 2005, there was a slight increase in Medicaid providers, to 2,849 Medicaid dental care providers, of whom 1,726 dentists actually provided at least one service as indicated by Medicaid.

Dental Educational Institutions

There are three schools of dentistry and 21 dental hygiene programs in Texas (see Figure 23). The dental schools and dental hygiene programs are primarily located in the urban counties of Texas. Only four dental hygiene programs are located in rural and border counties of Texas. Statistics are not available for the number of graduates from Texas dental programs who practice in Texas or in the rural and border counties of Texas.

**Figure 23:
Counties with
Dental and
Dental Hygiene
Programs**



Texas Data Source: Hospitals with dental services. Source - TDH, AHA, THA Annual Survey of Hospitals, 2001. Head Start Programs, www.acf.hhs.gov/programs/hsb. Licensed Dentists, all active dentists. Source - State Board of Dental Examiners (SBDE) 2002. THSteps Dentists. Source - Medicaid Report HISR301A, all dentists enrolled in the THSteps program in SFY2002, by license number. Active THSteps Dentists. Source - Medicaid Report HISR301A, dentists who submitted at least 1 claim in SFY 2002, by license number. Title V Providers, county location of Title V contractor's administrative headquarters and clinics. Source - Title V FFS Provider 2002.

b. Dental Workforce Diversity

One cause of oral health disparities is a lack of access to oral health services among minorities. Increasing the number of dental professionals from under-represented racial and ethnic groups is viewed as an integral part of the solution to improving access to care (USDHHS, 2000b). Data on the race/ethnicity of dental care providers were derived from surveys of professionally active dentists conducted by the American Dental Association (ADA, 1999). This survey found that 1.9% of active dentists in the United States identified themselves as African American, although that group constituted 12.1% of the U.S. population. Hispanic/Latino dentists made up 2.7% of U.S. dentists, compared with 10.9% of the U.S. population that was Hispanic.

Looking at age and gender distribution of dentists among urban and rural counties we find that: 1) dentists in rural counties are typically older than dentists in urban counties (average age of rural dentists is 50.5 years; the average age of urban dentists is 46.5 years; and the overall average age of Texas dentists is 46.9 years). 2) Most dentists are male (79%), but while the percentage of female is only 21%, it is known to be increasing. The average age of male dentists is greater (50 years) than the average age of female dentists (39 years). Proportionately fewer female dentists practice in rural areas (20%) than in urban areas (80%). The implications for the Dental HPSAs in Texas mean fewer potential practitioners for those areas. More incentives for female dentists to practice in rural areas would need to be implemented.

In the 2004-05 academic year, 254 students were enrolled in Texas dental schools. Table 13 reports the race/ethnic background of recent dental students: 56.3% White, 20.5% Asian/other, 19.3% Hispanic, and 3.9% African American.

Table 13. Texas Dental School Graduates: By Race/Ethnicity

School	Black/ African		Native		Not		Total
	White	American	Hispanic	American	Asian	Specified	
Baylor College of Dentistry	52	4	17	0	23	0	96
UTHSC - Houston Dental Branch *	41	1	11	1	11	0	95
UTHSC - San Antonio Dental School	50	5	21	1	11	5	93

Texas Data Source: Hospitals with dental services. Source - TDH, AHA, THA Annual Survey of Hospitals, 2001. Head Start Programs, www.acf.hhs.gov/programs/hsb. Licensed Dentists, all active dentists. Source - State Board of Dental Examiners (SBDE) 2002. THSteps Dentists. Source - Medicaid Report HISR301A, all dentists enrolled in the THSteps program in SFY2002, by license number. Active THSteps Dentists. Source - Medicaid Report HISR301A, dentists who submitted at least 1 claim in SFY 2002, by license number. Title V Providers, county location of Title V contractor's administrative headquarters and clinics. Source - Title V FFS Provider 2002.

Workforce Analysis:

<http://bhpr.hrsa.gov/healthworkforce/reports/profiles/>

From the American Dental Education Association (www.adea.org):

American Dental Education Association: Dental Education At A Glance

http://www.adea.org/DEPR/2004_Dental_Ed_At_A_Glance.pdf

American Dental Education Association: Allied Dental Education At A Glance

http://www.adea.org/CEPRWeb/DEPR/Documents/2004_Allied_Dental_Education_At-A-Glance.pdf

American Dental Education Association: Annual ADEA Survey of Dental School Seniors, 2004

http://www.adea.org/CEPRWeb/DEPR/Documents/2004_Senior_Survey.pdf]

Use of Dental Services

General Population

Adults who do not receive regular professional care can develop oral diseases that eventually require complex treatment and may lead to tooth loss and health problems. People who have lost all their natural teeth are less likely to seek periodic dental care than those with teeth, which, in turn, decreases the likelihood of early detection of oral cancer or soft tissue lesions resulting from medications, medical conditions, and tobacco use, as well as from poor-fitting or poorly maintained dentures. Persons with visits to the dentist in the last 12 months are shown in Table 14.

Although appropriate home oral health care and population-based prevention are essential, professional care is also necessary to maintain optimal oral health. Regular dental visits provide an opportunity for the early diagnosis, prevention, and treatment of oral diseases and conditions for people of all ages, and for the assessment of self-care practices.

Barriers in accessing oral health care include, but are not limited to: language barriers, racial barriers, financial barriers, geographical barriers, eligibility barriers, shortage of providers' barriers, and technological barriers. For instance, many children are enrolled in Medicaid but do not obtain dental services through Medicaid. An estimated 4.7 million uninsured children nationwide were eligible for Medicaid but not enrolled in 1996. The poor oral health and relatively low use of dental care even among Medicaid enrollees suggest that barriers other than access to insurance coverage contribute to the problems faced by low-income populations. Dental disease is a chronic problem among low-income populations and disparities exist despite coverage of dental services under Medicaid and SCHIP, among other programs (NICDR News, 2000).

Table 14. Proportion of Person Aged 2 and Older who Visited a Dentist in the Previous 12 Months

	US* (%)	Texas ^d (%)
TOTAL	43	59.2
Race and ethnicity		
American Indian or Alaska Native	41	DNA
Asian or Pacific Islander	36	DNA
Asian	DNA	DNA
Native Hawaiian or Other Pacific Islander	DNA	
Black or African American	27	52
White	46	65.9
Hispanic or Latino	27	48.6
Not Hispanic or Latino	45	DNC
Black or African American, not Hispanic or Latino	28	52
White, not Hispanic or Latino	48	65.9
Sex		
Female	39	60.9
Male	46	61.6
Education Level (persons aged 25 years and over)		
Less than high school	24	39.6
High school graduate	41	54.4
At least some college	57	61.5
Disability Status		
Persons with disabilities	30	DNC
Persons without disabilities	43	DNC
Select populations		
Children aged 2 to 17 years	48	44.1 ^{d,e}
Children at first school experience (aged 5 years)	50 ^b	49.8 ^f
3rd grade students	55 ^c	75.2 ^g
Children, adolescents, and young adults aged 2 to 19 years <200%FPL	33	56.1 ^h
Adults aged 18 years and older	41	59.2 ⁱ
Adults aged 65 years and older	40	62.4 ⁱ
Dentate adults aged 18 years and older	44	DNA
Edentate adults 18 and older	23	DNA
Adults aged 18 years and older with disabilities	DNA	DNA

Table 14 Sources:

Healthy People 2010, Progress Review, 2000. U.S. Department of Health and Human Services.

Available at <http://www.cdc.gov/nchs/ppt/hpdata2010/focusareas/fa21.xls>.

<These data are released annually. 2002 national data are available from the Medical Expenditure Panel Survey at <http://www.meps.ahrq.gov/>.>

DNA = Data not analyzed

* National data are for 2000.

^a Age-adjusted to 2000 U.S. standard population.

^b Data are for children aged 5–6 years.

^c Data are for children aged 8–9 years.

^d Texas Data Source(s): Behavioral Risk Factor Surveillance System 2004 and National Survey of Children's Health 2003

^e Statistics reported from NSCH 2003 are for children and adolescents ages 0–17

^f Statistics reported from NCHS 2003 are for children ages 1–5

^g Statistics reported from NCHS 2003 are for children ages 6–11

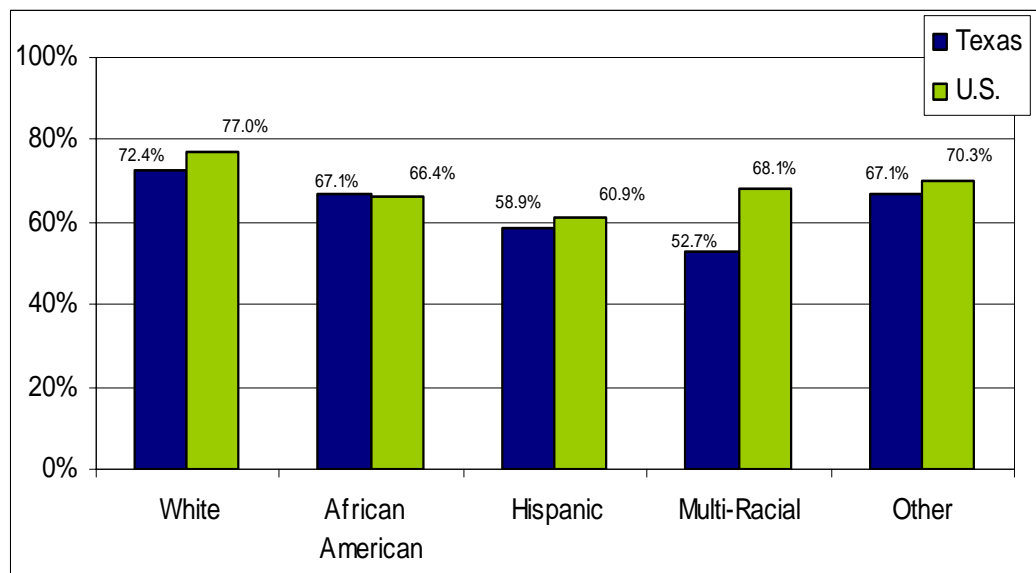
^h Statistics reported from NCHS 2003 are for children ages 2–17 FPL 100%–199%

Special Populations

Schoolchildren

Figure 24 (below) presents data from the National Health and Nutrition Examination Survey (NHANES) 1999-2002. For dental care by racial/ethnic category, Texas was lower than national averages for children and adolescents from all racial/ethnic groups, with the exception was African American children and adolescents (67.1% vs. 66.4%).

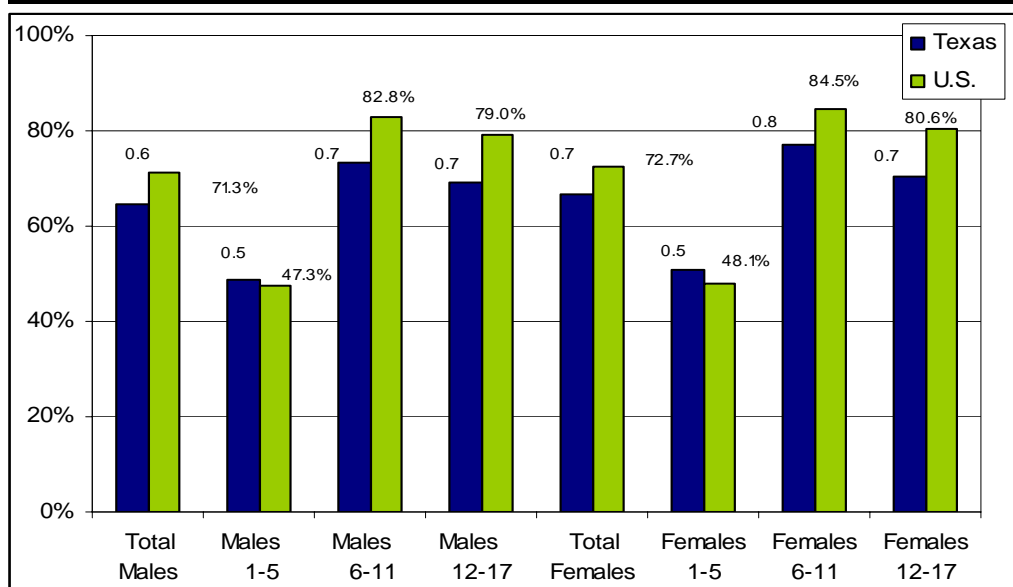
**Figure 24: Preventive Dental Care in the Past 12 months
among Children & Adolescents by Race/Ethnicity
Texas, 1999-2002**



Data source: National Health and Nutrition Examination Survey (NHANES), 1999-2002.

When state and national data for preventive visits are examined by age and sex, some notable differences are apparent for the 2004 calendar year (See Figure 25, below). All age group comparisons of Texas percentages show that females, ages 1-17, received slightly more preventive dental care visits than males in the same age group. The same trend is apparent in the national data.

**Figure 25: Preventive Dental Care in the Past 12 months
among Children & Adolescents by Age & Sex
Texas, 2006**



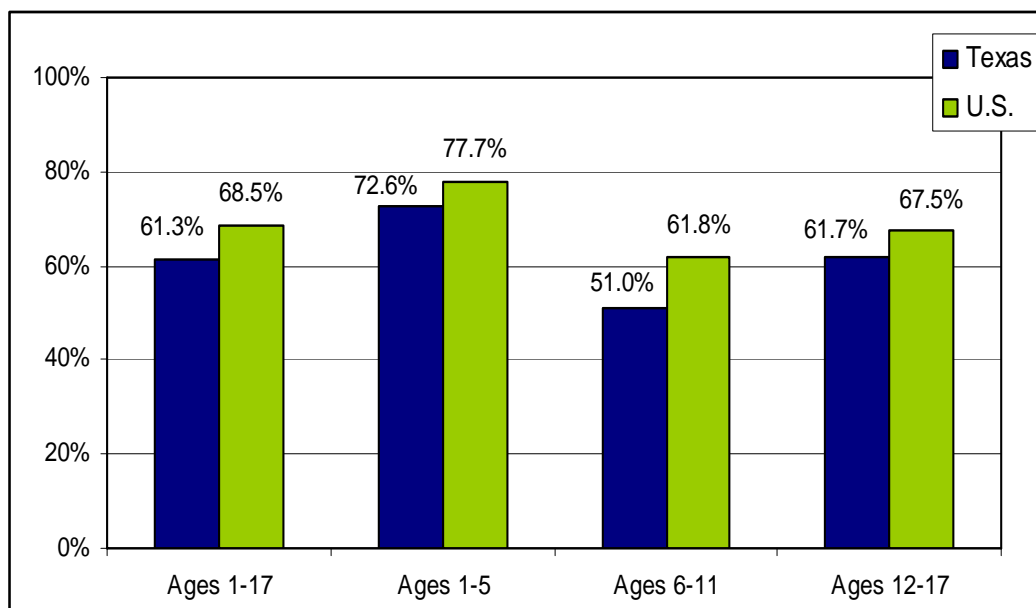
Data source: National Health and Nutrition Examination Survey (NHANES), 1999-2002

Figure 25 also shows that national averages for preventive care were higher than Texas percentages with the exception of children in the one to five year age range. Even though Texas ranked higher than national averages, children in this age group are reported to have received the least amount of preventive dental visits in the past 12 months. This finding supports the results of other research. Children between the ages of one and five, therefore, represent a special target for oral health efforts in Texas.

The NHANES also collected data about parents' perceptions of their children's dental health. Figures 26 to 28 (below) show the Texas percentages and national averages of children reported to have teeth in good and excellent condition.

Figure 26 (below) illustrates that the percent of Texas children reported to have teeth in good or excellent condition was lower across all age groups compared to the national averages. The most striking difference between state and national numbers is in the six to 11 year age range. The bar graph shows that Texas' percent is over 10 percentage points below the national average for six to 11 year olds (51.0% vs. 61.8%).

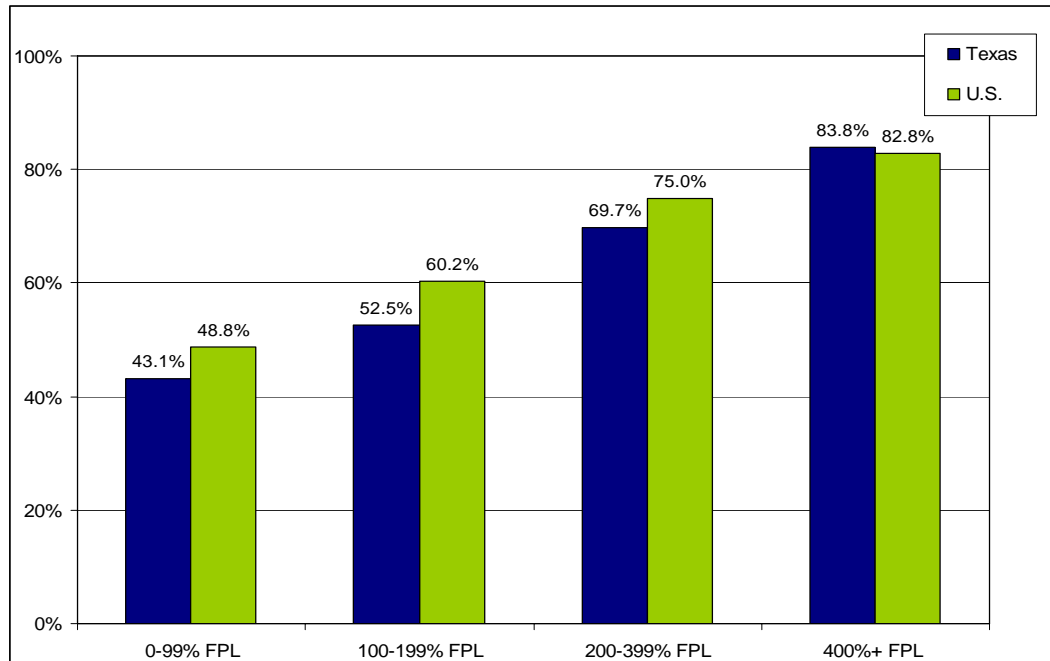
**Figure 26: Children & Adolescents with Teeth in Good or Excellent Condition by Age
Texas, 2006**



Data source: National Health and Nutrition Examination Survey (NHANES), 1999-2002.

Figure 27 (below) shows the income level and the parental report of child oral health status. The percentage of children in the 400 +% FPL reported to have teeth in good or excellent health was higher than the national average for the same income category (83.8% vs. 82.8%).

**Figure 27: Children & Adolescents with Teeth in Good or Excellent Condition by % FPL
Texas, 2006**

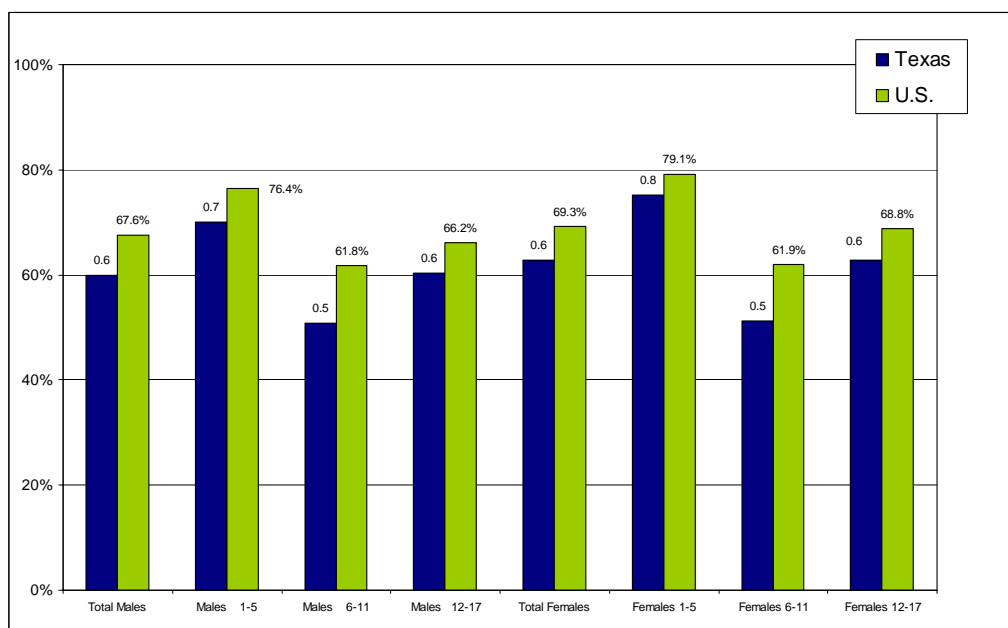


Data source: National Health and Nutrition Examination Survey (NHANES), 1999-2002.

NHANES data also revealed racial and ethnic differences in perceived child oral health. For example, Figure 28 (below) shows that across all racial/ethnic groups in Texas and nationally, a larger percent of White children were reported to have good or excellent oral health (78.9% and 76.4%). Texas also had a larger percent of multi-racial children reported to have good or excellent oral health compared to the national average (73.0% vs. 69.9%). The “Other” racial/ethnic category showed the most difference in a state vs. national comparison for reported good or excellent oral health. Texas was 12 percentage points below the national average (52.5% vs. 67.2%) for this group of people.

Figure 28 (below) also shows reported oral health across the age and sex of children. A larger percent of females, 1-17 years of age, in both Texas and nationally, was reported to have good or excellent oral health than was reported for males in the same age group. The graph also shows that Texas percentages were lower than national averages across all age ranges for both sexes.

**Figure 28: Children & Adolescents with Teeth in Good or Excellent Condition by Age & Sex
Texas, 2006**



Data source: National Health and Nutrition Examination Survey (NHANES), 1999-2002.

Pregnant Women

Studies documenting the effects of hormones on the oral health of pregnant women suggest that 25% to 100% of these women experience gingivitis and up to 10% may develop more serious oral infections (Amar & Chung, 1994; Mealey, 1996). Recent evidence suggests that oral infections such as periodontitis during pregnancy may increase the risk of preterm or low birthweight deliveries (Offenbacher et al., 2001). During pregnancy, a woman may be particularly amenable to disease prevention and health promotion interventions that could enhance her health and that of her fetus (Gaffield et al., 2001).

c. Dental Medicaid and State Children's Health Insurance Programs

Medicaid is the primary source of health care for low-income families, the elderly and disabled persons in the United States. This program became law in 1965 and is jointly funded by the federal and state governments to assist states in providing medical, dental, and long-term care assistance to people who meet certain eligibility criteria. People who are not U.S. citizens can receive Medicaid only to treat a life-threatening medical emergency; eligibility is determined based on state and national criteria. Dental services are a required service for most Medicaid-eligible individuals under the age of 21 years, as a required component of the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) benefit. Services must include, at a minimum, relief of pain and infections, restoration of teeth, and maintenance of dental health. Dental services may not be limited to emergency services for EPSDT recipients (Centers for Medicare and Medicaid, 2004).

Nationally, federal Medicaid expenditures for dental totaled \$2.3 billion in 2003, or 3% of the \$74 billion spent on dental services nationally (Centers for Medicare and Medicaid Services, 2004). In Texas, EPSDT is known as the Texas Health Steps program (THSteps). THSteps Dental coverage includes complete preventive care, restorative services, medically necessary orthodontic care, and emergency care. In 2004, Medicaid paid \$274.5 million for Medicaid dental services for children (0-20 years of age) in Texas. Medicaid-related health care expenditures for children in Texas represent 2.3% of the \$11.9 billion spent on health care in 2005 (DSHS, FHR&PD, 2006).

The most recent EPSDT financial report, from March 2006, includes federal and state expenditures for dental services and orthodontia. Federal dollars for EPSDT Dental and Orthodontia, with administrative costs were:

- 2003 - \$164,713,850
- 2004 - \$193,448,253
- 2005 - \$221,101,325

Table 15 (below) shows that 2,532,422 eligibles were enrolled in THSteps, as well as the number of preventive service and dental treatment recipients during SFY 2005. Of that number of potential recipients, 1,203,275 actually received at least one dental service. The number of dental care recipients includes 1,119,290 who received preventive dental services, and 623,069 who may have received dental treatment in addition to preventive dental services.

Table 15. THSteps Dental Services Accessed by those Eligible, SFY 2005		
	Number	% Eligibles
Dental Eligibles (ages 1-20)	2,532,422	
# Eligibles receiving any dental service	1,203,275	47.51%
# Eligibles receiving a checkup	1,119,290	44.20%
# Eligibles receiving a dental service, no checkup	83,985	3.32%

Table 15 Data Source: THSteps Dental Services Expenditure Data Report, SFY 2005

In Texas, the provision of oral health services in the public sector is a funding partnership. THSteps Dental/Medicaid (Title XIX) provides oral health care to Medicaid eligible children served by enrolled Medicaid providers. Title V (Maternal and Child Health Block Grant) provides oral health care to non-Medicaid eligible children through fee-for-service (FFS) contracted providers. DSHS Oral Health Program provides school-based dental sealant program to school children through portable clinics and preventive dental services to child in participating Head Starts. Children with Special Care Needs Services Program (CSHCN-SP) provides oral care to eligible children (FPL 200%). The Texas Water Fluoridation Program provides technical assistance to community water systems; monitors fluoridation levels in communities, and promotes the benefits of fluoridation.

Children's Health Insurance Program (CHIP)

During the 2003 Texas legislative session, CHIP dental benefits were eliminated, but were reinstated in 2006. As a result, only data from September 2000 to December 2003 reporting period are available, as current data is not available. Table 15 shows how much dental care CHIP was able to finance for children with family incomes below the federal poverty level (%FPL). The Table 15 (below) includes dental claims, the number of preventive care visits, and the number of children who exhausted the therapeutic cap between September 2000 and December 2003.

In total, CHIP financed 279,918 preventive care dental visits from September 2000 to December 2003. Dental claims totaled \$25.3 million for those children from families with incomes 100% to 150% below the FPL, which was the highest amount paid. The number of preventive care visits and the number of children who exhausted the therapeutic cap were highest for children in the same FPL. Over 31,000 children exhausted the \$300 therapeutic cap: the majority of these children were between the

ages of 5 and 12. While many children did receive some dental care during this period, these numbers point to the demand for dental care among some of the youngest and the poorest of Texas' children. See Table 16 (below).

Table 16. CHIP Dental Claims, Preventative Visits, & Therapeutic Cap Usage by Income			
% FPL	Dental Claims	Preventative Visits	Therapeutic Cap
<100%	\$10,178,842	58,191	6,424
100%-150%	\$25,320,686	143,518	15,858
151%-185%	\$10,651,743	62,847	7,095
186%-200%	\$2,599,263	15,362	1,760

Table 16 Data Source: CHIP Expenditure Data FY03

Community and Migrant Health Centers and other State, County, and Local Programs

Community Health Centers (CHCs) and/or Federally Qualified Health Center (FQHCs) provide family-oriented primary and preventive health care services for people living in rural and urban medically underserved communities. CHCs exist in areas where economic, geographic, or cultural barriers limit access to primary health care. The Migrant Health Program (MHP) supports the delivery of migrant health services, serving more than 650,000 migrant and seasonal farm workers nationally. Among other services provided, many CHCs and Migrant Health Centers provide dental care services.

In addition, Texas has 35 FQHCs with 194 sites that serve predominately uninsured, low-income/indigent, and minority children and women in 67 medically underserved counties. Most patients (43%) are under the age of 19 years. FQHCs serve 2.3% of the general population and 5.1% of the minorities in the state. Most of the patients live in underserved urban areas. FQHCs currently employ 49.7 full time equivalency (FTE) dentists and 15.5 FTE dental hygienists (Texas Association of Community Health Centers, Membership Directory, 2002).

Healthy People 2010 objective 21-14 is to "Increase the proportion of local health departments and community-based health centers, including community, migrant, and homeless health centers, that have an oral health component" (USDHHS, 2000b). In 2002, 61% of local jurisdictions and health centers had an oral health component (USDHHS, 2004b); the *Healthy People 2010* target is 75% nationally.

Indigent populations with no access to dental care and populations who are not covered by dental insurance plans may have access to dentists through State and/or locally funded dental care programs, fee-for-service plans, sliding-fee-scale plans, and charity care. The principal option for these poverty-level and indigent populations are fee-for-service plans, which most cannot afford, or state and/or locally funded dental care programs that are limited in the number of clients they can serve.

Most (90%) of the 7,735 dental generalists in Texas practice in urban areas. There are 17 registered public health dentists in Texas. Ten other public health dentists are located in community health centers. Seventeen percent (n=87) of the hospitals in Texas offer dental services (TDH AHA THA, 2001). Texas dental schools offer limited dental services to selected patients, mostly adults. Local health departments, many of whom are also FQHCs, employ public health dentists and offer limited dental services. Some not-for-profit organizations offer dental services to underserved populations.

VII. CONCLUSIONS

"The Vision of Texas Department of State Health Services is that Texans have access to effectively delivered public health, medical care, mental health and substance abuse services and all Texans live and work in safe, healthy communities... The Oral Health Program (OHP) at the Department of State Health Services (DSHS) serves to encourage the residents of the State of Texas to improve and maintain good oral health."

-Texas DSHS

Oral diseases have an immense impact on the oral and general health of all people. Oral health problems have psychological, social, and economic consequences ranging from poor self-image, social isolation, and diminished work and academic capacity. However, many people in financial straits forego or neglect their oral health in lieu of other issues they may face.

The relationship between poor or no healthcare coverage and poor physical and financial health is explicit in the issues of oral and dental health. Mouth and throat diseases—ranging from cavities to cancer—cause pain and disability for millions of Americans. This fact is disturbing because almost all oral diseases can be prevented. As quoted by the Surgeon General, "Safe and effective measures exist to preventing oral disease, but they are underused" (David Satcher, MD, PhD Surgeon General, 1998-2002).

Every year, Texas' public health system is faced with new challenges and new proposed solutions. America's healthcare system and the public health system in Texas is always developing, changing, adapting, or refining its policies and systems as new challenges arise or old issues fail to be addressed. This document represents the most complete source of information regarding the oral health status of Texans. The state profile of oral health in 2006 is based on the most current data available.

Texas is a diverse, vast, and complex state. Its public health system is equally complex. The concept of public health seems simple: public health is concerned with the health of the public. However, the functions and topics of public health extend beyond disease prevention or provision of health care for the uninsured or impoverished. The Texas Department of State Health Services is the entity responsible for public health in Texas and holds the responsibility to safeguard the health and well being of its residents. Its vision for the future is that "Texans have access to effectively delivered public health, medical care, mental health and substance abuse services and all Texans live and work in safe, healthy communities" (DSHS website accessed 2007). Underlying this vision are the ideas of social justice and equity; that every citizen by the mere fact of being a citizen can expect a certain level of medical care.

The task of maintaining and improving the health of the state involves educational and health promotional efforts about physical and mental health issues, as well as the operation of disease, injury, and disability prevention/intervention programs.

Hundreds of thousands of Texans lack health insurance. As in Texas and elsewhere in America, obtaining insurance or maintaining healthcare coverage is an on-going challenge. Insurance is expensive. For those fortunate enough to have insurance coverage through employment, the costs may not be an issue. For those individuals who must provide their own coverage, the costs may be beyond their abilities to pay. However, not having health insurance is a risky prospect. Poor health can propel individuals into further financial consequences.

Recently the importance of oral health was championed under the leadership of the Office of the Surgeon General, which led a broad coalition of public and private organizations and individuals to develop of the National Call To Action To Promote Oral Health (US DHHS, 2003). The goal of this document was to enthuse all those involved in oral health to take action against oral disease and to affirm that oral health is vital to general health and welfare.

Texas public health agencies recognize its role in the prevention, early diagnosis, and treatment of oral and other chronic conditions. The oral health community has been galvanized through collaborative efforts and the promotion of improved disease management. Dental and medical professionals are working together to improve the health status of Texans by identifying communities at high risk for multiple chronic diseases and by coordinating medical and oral health care with public and private services.

Because of such efforts, Texas is reaching or has surpassed some of the *HP 2010* oral health objectives. Significant progress has been made in reducing the oral cancer death rate. Access to community water fluoridation in Texas exceeds national averages.

The oral health of Texas children is improving and some groups of Texas' children enjoy excellent oral health. Nonetheless, many people continue to suffer disproportionate levels of oral disease. Some progress has been made in reducing cavities in children living in poverty. The most advanced cases of oral disease are still found primarily among poor, disabled or HIV + children, and some racial/ethnic minority groups. Above all, people who have less access to dental care are more vulnerable to dental decay.

While progress has been made, a number of oral health priorities remain. Focus continues on the provision of preventive dental services to vulnerable target populations. While access to fluoridated water supplies is high, efforts to increase the numbers of communities with optimal levels of fluoridation in their water supplies continues to be recongnized as a priority. The Oral Health Program at DSHS continues

to establish scientifically based protocols and methodologies in the surveillance of the oral health status of Texans. The public oral health system is in a constant state of revision and refinement as it evaluates its policies and services.

Oral Health in Texas is intended to bring oral health issues to the forefront of public debate. The document serves as a gauge for the progress Texas is making in reaching the *HP 2010* oral health goals, while documenting the effects of current population characteristics on the burden of oral disease. By understanding the current oral health challenges and through collaborative efforts by public and private agencies, businesses, communities and individuals, the oral health of Texas' residents can be improved.

VIII. REFERENCES

"2002 Membership Directory," Texas Association of Community Health Centers, 2002, page 12.

Academy of General Dentistry. 2003. Consumer information: An Apple a Day May Keep the Dentist Away. [Web site]. Cited January 21, 2002; available at www.agd.org/consumer/topics/nutrition/cavity.html.

Academy of General Dentistry. 2001. Pouring Rights: Schools Long-term Deals to Sell Soda Kick Kids' Nutrition in the Teeth. [Web site]. Available at www.agd.org/consumer/media/may01/pouringrights.html.

AHRQ Study Links Secondhand Smoke to Tooth Decay in Children. Press Release, March 11, 2003. Agency for Healthcare Research and Quality, Rockville, MD. March 12 issue of the Journal of the American Medical Association (JAMA).

Alexander, R. E. (2000). Readability of published dental educational materials. The Journal of the American Dental Association. 131(7): 937-942.

Amar S, Chung KM. Influence of Hormonal Variation on the Periodontium in Women. *Periodontal* 2000 1994; 6:79-87.

American Academy of Pediatrics, Medical Library. [Web site]. Available at www.agd.org/consumer/topics/nutrition/cavity.html.

American Academy of Periodontology. Position paper: Tobacco use and the periodontal patient. *J Periodontal* 1999; 70: 1419-27.

American Dental Association. *Distribution of dentists in the United States by Region and State*, 1997. Chicago, IL: American Dental Association Survey Center; 1999.

Anaise, J. Z., & Zilkah E. (1976). The effectiveness of a dental education program on oral cleanliness for school children of 11 to 14 years old. Refuat Hapeh Vehashinayim, 25(4): 23-27.

Beck JD, Offenbacher S, Williams R, Gibbs P, Garcia R. Periodontics: a risk factor for coronary heart disease? *Ann Periodontal* 1998; 3(1): 127-41.

Bellini, H. T., Arneberg, P., & von der Fehr, F. R. (1981). Oral hygiene and caries. A review. *Acta odontologica*, 39(5): 257-265.

Blinkhorn, A. S. (1998). Dental health education: what lessons have we ignored? *British Dental Journal*, 184(2): 8-59.

Blot WJ, McLaughlin JK, Winn DM, Austin DF, Greenberg RS, Preston-Martin S. Smoking, and drinking in relation to oral and pharyngeal cancer. *Cancer Res* 1988; 48(11): 3282–7.

Brocato R. 2201. Head Start and Partners Forum on Oral Health. Head Start Bulletin 71:1-43. Washington, DC: Head Start Bureau.

Brooks JD, Mertz-Fairhurst EJ, Della-Giustina VE, Fairhurst CW, Williams JE. A comparative study of the retention of 2 pit and fissure sealants: One-year results. *The Journal of Preventive Dentistry* 1976; 3:436.

Brown LJ, Wagner KS, Johns B. Racial/ethnic variations of practicing dentists. *J Am Dent Assoc* 2000; 131:1750–4.

Bureau of Primary Health Care. Community Health Centers: Program information. 2005. Available at: <http://www.bphc.hrsa.gov/programs/CHCPrograminfo.asp>.

Burt BA, Eklund BA. *Dentistry, dental practice, and the community*. 5th ed. Philadelphia: WB Saunders; 1999.

Callaghan WM, et al. 2006. The contribution of preterm birth to infant mortality rates in the United States. *Pediatrics* 118(4): 1566-1573. Abstract available at <http://pediatrics.aappublications.org/cgi/content/abstract/118/4/1566?rss=1>.

Caufield PW, Cutter GR, Dasanayake AP. Initial acquisition of mutans streptococci by infants: evidence for a discrete window of infectivity. *Journal of Dental Research* 1993; 72(1): 37-45.

Caufield PW, Griffen AL. Dental caries. An infectious and transmissible disease. *Pediatric Clinics of North America* 2000; 47(5): 1001-19.

Caufield PW, Griffen AL. Dental caries. An infectious and transmissible disease. *Pediatric Clinics of North America* 2000; 47(5): 1001-19.

Caufield PW, Wannemuehler YM, Hansen JB. Familial clustering of the *Streptococcus mutans* cryptic plasmid strain in a dental clinic population. *Infection and Immunity* 1982; 38(2): 785-7.

CDC Oral Health Resources, Water Fluoridation: Frequently Asked Questions [Web site]. Available at <http://www.cdc.gov/OralHealth/factsheets/fl-faqs.htm>.

Centers for Disease Control and Prevention. Impact of Targeted, School-Based Dental Sealant Programs in Reducing Racial and Economic Disparities in Sealant Prevalence Among Schoolchildren — Ohio, 1998-1999. *MMWR*. 2001; 45(34): 736-8.

Centers for Disease Control and Prevention. Achievements in public health, 1900–

1999: fluoridation of drinking water to prevent dental caries. *MMWR* 1999; 48(41): 933–40.

Centers for Disease Control and Prevention. Annual smoking-attributable mortality, years of potential life lost, and economic costs—United States, 1995–1999. *MMWR* 2002; 51(14): 300–3.

Centers for Disease Control and Prevention. Populations receiving optimally fluoridated public drinking water — United States, 2000. *MMWR* 2002; 51(7): 144–7.

Centers for Disease Control and Prevention. Preventing and controlling oral and pharyngeal cancer. Recommendations from a national strategic planning conference. *MMWR* 1998; 47(No. RR-14): 1–12.

Centers for Disease Control and Prevention. Recommendations for using fluoride to prevent and control dental caries in the United States. *MMWR Recomm Rep* 2001; 50(RR-14): 1–42.

Centers for Medicare and Medicaid Services. Health Accounts. CMS Web site. Last modified 17 March 2005. Available at <http://www.cms.hhs.gov/statistics/nhe/>.

Centers for Medicare and Medicaid Services. National Health Expenditure (NHE) amounts by type of expenditure and source of funds: Calendar years 1965–2013. Updated October 2004. Available at: <http://www.cms.hhs.gov/oralhealth/6.asp>.

Children's Dental Health Project, "Prevention Focus"; accessed March 8, 2003, at <http://www.cdhp.org/Index.asp?PA=1&XX=124&XX=101&XX=127&XX=81>.

Christen AG, McDonald JL, Christen JA. The impact of tobacco use and cessation on nonmalignant and precancerous oral and dental diseases and conditions. Indianapolis, IN: Indiana University School of Dentistry; 1991.

Collett, Brent R. Speltz, Matthew L. Social-Emotional Development of Infants and Young Children With Orofacial Clefts. *Infants & Young Children: An Interdisciplinary Journal of Special Care Practices*; Oct-Dec2006, Vol. 19 Issue 4, p262-291, 30p.

Dasanayake AP. Poor periodontal health of the pregnant woman as a risk factor for low birth weight. *Ann Periodontol* 1998; 3:206–12.

Davenport ES, Williams CE, Sterne JA, Sivapathasundram V, Fearne JM, Curtis MA. The East London study of maternal chronic periodontal disease and preterm low birth weight infants: Study design and prevalence data. *Ann Periodontol* 1998; 3: 213–21.

De Stefani E, Deneo-Pellegrini H, Mendilaharsu M, Ronco A. Diet and risk of cancer of the upper aerodigestive tract--I. Foods. *Oral Oncol* 1999; 35(1): 17–21.

Department of Health and Human Services, Centers for Disease Control and Prevention. At a Glance (2003). "Oral Health: Preventing cavities, gum disease, and oral cancers".

Doherty, S. A., & Fielder, F. C. (1995). The effects of health education on patients' subsequent dental visits: a practice-based research in health promotions. *African dental journal: official publication of the federation of African Dental Associations = Journal dentaire africain / FADA*, 9, 9-14.

Federal Dental Health Professional Shortage Areas (HPSAs) - The U.S. DHHS HPSA has identified 107 counties as having a shortage of dental health services. Seventy-six (76) of these designations are for whole counties.

Filling the gaps: Oral Health in America. The Oral Health America National Grading Project 2001-2002. <http://www.healthinschools.org/education.asp>.

Finn, E. Wolpin, S. 2005. Dental Disease in Infants and Toddlers: A Transdisciplinary Health Concern and Approach. *Zero to Three*. January, p 28-33.

Fiore MC, Bailey WC, Cohen SJ, et al. Treating tobacco use, and dependence. Clinical practice guideline. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service; 2000. Available at: http://www.surgeongeneral.gov/tobacco/treating_tobacco_use.pdf.

Frazier, P. J. (1980). School based instruction for improving oral health: closing the knowledge gap. *International Dental Journal*, 30(3), 257-268.

From the Office of the Surgeon General, U.S. Department of Health and Human Services, May 2000. <http://www.cdc.gov/OralHealth/factsheets/srg20000-fs3.htm>.

Gaffield ML, Gilbert BJ, Malvitz DM, Romaguera R. Oral health during pregnancy: An analysis of information collected by the pregnancy risk assessment monitoring system. *J Am Dent Assoc* 2001; 132(7): 1009–16.

Genco RJ. Periodontal disease and risk for myocardial infarction and cardiovascular disease. *Cardiovasc Rev Rep* 1998; 19(3): 34-40.

Gilpin JL. 1997. Pit and fissure sealants: A review of the literature. *Journal of Dental Hygiene* 71(4): 150–158.

Greenberg, J. S. (1977). An analysis of various teaching modes in dental health education. *The Journal of School Health*, 47(1): 26-32.

Griffin SO, Jones K, Tomar SL. An economic evaluation of community water fluoridation. *J Public Health Dent* 2001; 61(2): 78–86.

Herrero R. Chapter 7: Human papillomavirus and cancer of the upper aerodigestive tract. *J Natl Cancer Inst Monogr* 2003; (31): 47–51.

Houston, V., Bull, R. 1994. Perceived Effect of Abnormal Facial Appearance. *European Journal of Social Psychology*; Mar, Vol. 24 Issue 2, p279-284, 6p.

International Agency for Research on Cancer (IARC). IARC Monographs on the Evaluation of Carcinogenic Risks to Humans, Volume 89, Smokeless tobacco, and some related nitrosamines. Lyon, France: World Health Organization, International Agency for Research on Cancer; 2005 (in preparation).

Jeffcoat MK, Geurs NC, Reddy MS, Cliver SP, Goldenerg RL, Hauth JC. Periodontal infection and pre-term birth: results of a prospective study. *The Journal of the American Dental Association* 2001; 132(7): 875-80.

Johnson NW. *Oral Cancer*. London: FDI World Press, 1999.

Komaromy M, Grumbach K, Drake M, Vranizan K, Lurie N, Keane D, Bindman AB. The role of black and Hispanic physicians in providing health care for underserved populations. *N Engl J Med* 1996; 334(20): 1305–10.

Kressin NR, De Souza MB. Oral health education and health promotion. In: Gluck GM, Morganstein WM (eds). *Jong's community dental health*, 5th ed. St. Louis, MO: Mosby; 2003: 277–328.

Krissah Williams. 2005. Trying to Absorb the Newly Unemployed Those Displaced by Storm Hit Job Fairs, and Many Are Fighting for Already Scarce Low-Skill Work. *Washington Post*. Sept. 9; Page D01.

Lange, D. E. (1988). The practical approach to improved oral hygiene. *International dental journal*, 38(3): 154-162.

Levi F. Cancer prevention: epidemiology and perspectives. *Eur J Cancer* 1999; 35(14): 1912–24.

Markovic N. Women's oral health across the lifespan. *Dental clinics of North America* 2001; 45(3): 513-21.

McCormick MC. The contribution of low birth weight to infant mortality and childhood morbidity. *The New England Journal of Medicine* 1985; 312(2): 82-90.

McLaughlin JK, Gridley G, Block G, et al. Dietary factors in oral and pharyngeal cancer. *J Natl Cancer Inst* 1988; 80(15): 1237–43.

Mealey BL. Periodontal implications: medically compromised patients. *Ann Periodontol* 1996; 1(1): 256–321.

Morse DE, Pendrys DG, Katz RV et al. Food group intake, and the risk of oral epithelial dysplasia in a United States population. *Cancer Causes Control* 2000; 11(8): 713-20.

National Center for Children in Poverty. 2006. Low-Income Children in the United States: National and State Trend Data, 1994-2004. Columbia University: Mailman School of Public Health. http://www.nccp.org/media/nst06_text.pdf.

National Center for Education in Maternal and Child Health. Trends Children's Oral Health. Arlington, VA, 1999.

NIDCR News. First-ever Surgeon General's Report on Oral Health Finds Profound Disparities in Nation's Population. Rockville, MD: National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.

Offenbacher S, Jared HL, O'Reilly PG, Wells SR, Salvi GE, Lawrence HP, et al. Potential pathogenic mechanisms of periodontitis associated pregnancy complications. *Ann Periodontol* 1998; 3(1): 233-50.

Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G, et al. Periodontal infection as a possible risk factor for pre-term low birth weight. *Journal of periodontology* 1996; 67(10 Suppl): 1103-13.

Offenbacher S, Katz V, Fertik G, Collins J, Boyd D, Maynor G, et al. Periodontal infection as a possible risk factor for pre-term low birth weight. *Journal of Periodontology* 1996; 67(10 Suppl): 1103-13.

Offenbacher S, Lieff S, Boggess KA, Murtha AP, Madianos PN, Champagne CM, et al. Maternal periodontitis and prematurity. Part I: Obstetric outcome of prematurity and growth restriction. *Ann Periodontol* 2001; 6(1): 164-74.

Phelan JA. Viruses and neoplastic growth. *Dent Clin North Am* 2003; 47(3): 533-43.

Pieper, K. (1979). The effect of knowledge of caries prevention on oral hygiene. *Deutsche zahnärztliche Zeitschrift*, 34(2), 113-115. [Article in German]

Poche, C., McCubbrey, H., & Munn, T. (1982). The development of correct tooth brushing technique in preschool children. *Journal of applied behavior analysis*, 15(2): 315-320.

Promoting Oral Health: Interventions for Preventing Dental Caries, Oral and Pharyngeal Cancers, and Sports-Related Craniofacial Injuries, November 30, 2001/ MMWR 50(rr21); 1-13. A report on recommendations of the task force on community preventive services.

Reeves S. 2003. Study links vending machines, obesity
Officials: Health risks outweigh revenue from school contracts. *The Daily Texan* August

23. www.dailytexanonline.com

Redford M. Beyond pregnancy gingivitis: Bringing a new focus to women's oral health. *J Dent Educ* 1993; 57(10): 742–8.

Ressler-Maerlender, J. Krishna, R., Robison, V. 2005. Oral Health during Pregnancy: Current Research. *Journal of Women's Health* (15409996); Dec, Vol. 14 Issue 10, p880-882, 3.

Ries LAG, Eisner MP, Kosary CL, Hankey BF, Miller BA, Clegg L, et al. (eds). SEER Cancer Statistics Review, 1975-2001, National Cancer Institute: Bethesda, MD; National Cancer Institute; 2004. Available at http://seer.cancer.gov/csr/1975_2001/.

Sahyoun, N R. Tooth and Mouth Problems and Nutrition among Older People. *Generations*; Fall2004, Vol. 28 Issue 3, p18-24, 4p.

Sarvia, M. E., Bush, J. P., & Mourino, A. P. (1989). Psychomotor skills and incentive as predictors in a children's tooth brushing program. *The Journal of pedodontics*, 14(1): 31-35.

Satcher, D. Oral Health in America. A report of the Surgeon General. Washington, DC; Dept. of Health and Human Services, U.S. Public Health Service; 2000: 37-38.

Satcher, D. Oral Health in America. A report of the Surgeon General. Washington, DC; Dept. of Health and Human Services, U.S. Public Health Service; 2000: 37-38.

Scannapieco FA, Bush RB, Paju S. Periodontal disease as a risk factor for adverse pregnancy outcomes. A systematic review. *Ann Periodontol*. 2003; 8(1): 70–8.

Carroll, P., Shute, R. 2005. School peer victimization of young people with craniofacial conditions: A comparative study. *Psychology, Health & Medicine*; Aug, Vol. 10 Issue 3, p291-304, 14p.

Shanks TG, Burns DM. Disease consequences of cigar smoking. In: National Cancer Institute. Cigars: Health effects and trends. Smoking and Tobacco Control Monograph 9th edition. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Cancer Institute, 1998.

Siegal MD, Farquhar CL, Bouchard JM. 1997. Dental sealants: Who needs them? *Public Health Reports* 112(2): 98–106.

Silverman SJ Jr. *Oral Cancer*, 4th edition. Atlanta, GA: American Cancer Society, 1998.

Simmons, S., Smith, R., & Gelbier, S. (1983). Effect of oral hygiene instruction on brushing skills in preschool children. *Community dentistry and oral epidemiology*, 11(4): 193-198.

Steinberg BJ. Women's oral health issues. *Journal of Dental Education* 1999; 63(3): 271-5.

Steinberg BJ. Women's oral health issues. *Journal of Dental Education* 1999; 63(3): 271-5.

Steve H. Murdock Steve White Md. Nazrul Hoque Beverly Pecotte XiuHong You Jennifer Balkan. 2002. The Texas Challenge in the Twenty-First Century: Implications of Population Change for the Future of Texas. Department of Rural Sociology Texas A&M University System Departmental Technical Report 2002-1 December 2002. The Center for Demographic and Socioeconomic Research and Education.

Taylor GW. Bidirectional interrelationships between diabetes and periodontal diseases: An Epidemiologic Perspective. *Ann Periodontol* 2001; 6(1): 99–112.

TDH Fluoridation Program, 2002.

TDH, AHA, THA. 2001 Annual Survey of Hospitals.

Texans and Tobacco: A report to the 78th Texas Legislature, January 2003
Submitted in compliance with the Texas Health and Safety Code 161.0901 by the
Texas Department of Health Bureau of Chronic Disease & Tobacco Prevention
Office of Tobacco Prevention & Control.

Texas Health and Human Services Commission, Research, and Forecasting Section,
March, 2003.

Texas State Data Center and Office of the State Demographer. *Texas Population Estimates Program* (online), <http://txsdc.utsa.edu/tpepp/txpopest.php>, San Antonio, TX: Texas State Data Center and Office of the State Demographer, Institute for Demographic and Socioeconomic Research, The University of Texas at San Antonio, October 24, 2006.

The Oral Health and Chronic Disease Connection. The Association of State and Territorial Health Officials May 2002 Report.

The potential association between smoking and endodontic disease. By: Duncan, H. F.; Pitt Ford, T. R. *International Endodontic Journal*, Nov2006, Vol. 39 Issue 11, p843-854, 12p, 1 chart; DOI: 10.1111/j.1365-2591.2006.01141.x; (AN 22541766).

Thomson, A. M., Cunningham, S.J., & Hunt, N.P. (2001). A comparison of information retention at an initial orthodontic consultation. *European Journal of Orthodontics*, 23(2): 169-178.

Tinanoff, N., Kanellis, M. J., & Vargas, C. M. (2002). Current understanding of the epidemiology mechanisms, and prevention of dental caries in preschool children.

Pediatric Dentistry, 24(6): 543-551.

Tomar SL, Asma S. Smoking-attributable periodontitis in the United States: Findings from NHANES III. *J Periodontol* 2000; 71:743–51.

Tomar SL, Husten CG, Manley MW. Do dentists and physicians advise tobacco users to quit? *J Am Dent Assoc* 1996; 127(2): 259–65.

Tsamtsouris, A, White, G. E., & Clark, E. R. (1979). The effect of instruction and supervised tooth brushing on the reduction of dental plaque in kindergarten children. *ASDC journal of dentistry for children*, 46(3), 204-209.

U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes for Health, 2000.

U.S. Department of Health and Human Services. Oral Health in America: A Report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.

U.S. Department of Health and Human Services, Health Resources and Services Administration, Maternal and Child Health Bureau. The National Survey of Children's Health 2003. Rockville, Maryland: U.S. Department of Health and Human Services, 2005.

U.S. Department of Health and Human Services. *Healthy People 2010*, 2nd Edition. Washington, DC; U.S. Government Printing Office; 2000.

U.S. Department of Health and Human Services. *National Call to Action to Promote Oral Health*. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Dental and Craniofacial Research; 2003. NIH Publication No. 03-5303.

U.S. Department of Health and Human Services. *Healthy People 2010 progress review: Oral health*. Washington, DC: U.S. Department of Health and Human Services, Public Health Service; 2004b. Available at: <http://www.healthypeople.gov/data/2010prog/focus21/>.

U.S. Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research; 2000a. NIH Publication No. 00-4713.

U.S. Department of Health and Human Services. Oral Health. In: *Healthy People 2010*,

2nd edition. With Understanding and Improving Health and Objectives for Improving Health. 2 vols. Washington, DC: U.S. Government Printing Office; 2000b.

U.S. Department of Health and Human Services. *The health consequences of using smokeless tobacco: A report of the Advisory Committee to the Surgeon General*. Bethesda, MD: U.S. Department of Health and Human Services, Public Health Service; 1986. NIH Publication No. 86-2874.

U.S. Department of Health and Human Services. *The health consequences of smoking: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 2004a. Available at: http://www.cdc.gov/tobacco/sgr/sgr_2004/index.htm.

Vargas CM, Crall JJ, Schneider DA. 1998. Sociodemographic distribution of pediatric dental caries. NHANES III, 1988-1994. *Journal of the American Dental Association* 129(9): 1229-1238.

Weaver RG, Ramanna S, Haden NK, Valachovic RW. Applicants to U.S. dental schools: an analysis of the 2002 entering class. *J Dent Educ* 2004; 68(8): 880–900.

Worthington, H.V., Hill, K.B., Mooney, J., Hamilton, F.A., & Blinkhorn, A. S. (2001). A cluster randomized controlled trial of a dental health education program for 10-year-old children. *Journal of public health dentistry*, 61(1): 22-27.

Zimmer, S., Bizhang, M., Seemann, R., & Barthel, C.R. (2001). Effective of preventive programs on oral hygiene of adults and school children, *Gesundheitswesen*, 63(2): 98-101. [Article in German]

Appendices a & b

Appendix a. Indicators of Oral Health Status

Indicator	NOHSS	CSTE	HP2010	Source
Dental visits	✓	✓	21-10	NHIS-BRFSS
Teeth cleaning	✓	✓		BRFSS
No tooth loss		✓	21-13	BRFSS
Complete tooth loss	✓	✓	21-4	BRFSS
Fluoridation status	✓	✓	21-9	WFRS
Caries experience	✓	✓	21-1	BSS
Untreated caries	✓	✓	21-2	BSS
Sealants	✓	✓	21-8	BSS
Oral and pharyngeal cancer	✓	✓	3-6	NCHS-Registries

Appendix b. Data Release Calendar and Data Source Guide for Oral Health Indicators

Data Source	Website Location	Frequency of Release	Past Release Date	Future Release Dates	Indicator
Synopses of State and Territorial Dental Public Health Programs	http://www2.cdc.gov/nccdp/hp/doh/synopses/index.asp or www.cdc.gov/oralhealth or www.astdd.org	Annual collection, 6 month lag	FY2004 (2005 Synopses, available from ASTDD June 2005, from Web late 2005)	<ul style="list-style-type: none"> FY2005 (2006 Synopses, available from ASTDD June 2006, from Web late 2006) FY2006 (2007 Synopses, available from ASTDD June 2007, from Web late 2007) 	<p>System for recording and referring infants and children with cleft lip and cleft palate, all</p> <p>Oral health surveillance system, all</p> <p>Tribal, state, and local dental programs with a public health trained director, all</p>
Behavioral Risk Factor Surveillance System (BRFSS)	http://www.cdc.gov/brfss		2004 data released June 16, 2005	<ul style="list-style-type: none"> 2004 – released June 16, 2005 2005 – optional module only, expected June 2006 2006 – expected June 2007 2007 – optional module only, expected June 2008 	Percentage of people who had their teeth cleaned within the past year, visited dentist in past year, and complete tooth loss ages 18 or higher.
Health Resources and Services Administration (HRSA), Bureau of Primary Health Care (BPHC)	http://datawarehouse.hrsa.gov/				Community-based health centers and local health departments with oral health components, all

Data Source	Website Location	Frequency of Release	Past Release Date	Future Release Dates	Indicator
Medical Expenditure Panel Survey (MEPS) (also available from NHANES, BRFSS, and NHIS)	http://www.meps.ahrq.gov/Data_Public.htm	2 years		<ul style="list-style-type: none"> • 2003 [data] expected 2006 • 2004 expected 2007 • 2005 expected 2008 • 2006 expected 2009 • 2007 expected 2010 • 2008 expected 2011 	Dental visit within past 12 months, Children and adults ages 2+
National Assembly of School Based Health Care (NASBHC)	http://www.nasbhc.org/ or http://www.nasbhc.org/EQ/2001tables.htm	Annual collection, 6 month lag	FY2004 (2005 Synopses, available from ASTDD June 2005, from Web late 2005)	<ul style="list-style-type: none"> • FY2005 (2006 Synopses, available from ASTDD June 2006, from Web late 2006) • FY2006 (2007 Synopses, available from ASTDD June 2007) 	School-based health centers with oral health component, K-12
National Health Interview Survey (NHIS)	http://www.cdc.gov/nchs/nhis.htm	Annual collection, 6 month lag for release	2003 data released December 16, 2004	2005 [data] expected July, 2006	Oral and pharyngeal cancer exam within past 12 months, age 40+
National Health and Nutrition Examination Survey (NHANES)	http://www.cdc.gov/nchs/nhanes.htm	2 years	2001-2002 data released January 2005	<ul style="list-style-type: none"> • 2003-2004 [data] Spring 2006 • 2005-2006 Spring 2008 • 2007-2008 Spring 2010 	Dental Caries (tooth decay) Experience Untreated Caries Adults with no tooth loss* Edentulous (toothless) older adults, aged 65-74 years* Periodontal (gum) diseases, adults aged 35-44 years Dental sealants

Data Source	Website Location	Frequency of Release	Past Release Date	Future Release Dates	Indicator
National Nursing Home Survey (NNHS)	http://www.cdc.gov/nchs/about/major/nnhsd/nnhsd.htm	Conducted in 1973-74, 1977, 1985, 1995, 1997, and 1999			Adults' use of oral health care system by residents in long term care facilities
U.S. Cancer Statistics	http://www.cdc.gov/cancer/npcr/uscs/	About 3 years; data collection is ongoing	<ul style="list-style-type: none"> • 2001 released 2004, (online 2005) • 2002 released 2005 (online) 	<ul style="list-style-type: none"> • 2003 [data] expected 2006 • 2004 expected 2007 • 2005 expected 2008 • 2006 expected 2009 • 2007 expected 2010 	Oral and pharyngeal cancer incidence rates and death rates (per 100,000 population) [Oral Cancer Mortality] Oral and pharyngeal cancers detected at earliest stages
Water Fluoridation Reporting System (WFRS) (also National Oral Health Surveillance System: NOHSS)	http://apps.nccd.cdc.gov/WFRS/default.htm or http://www2.cdc.gov/nohss/FluoridationV.asp	Biennially	2004 data released September 2005	2006 expected June 2007 2008 expected June 2009	Population served by fluoridated water systems, all
Texas Basic Screening Survey					Caries prevalence among 3rd graders in Texas. Treatment.

*See also BRFSS

Data Source Guide for Oral Health Indicators

Topic	Subtopic 2	Resource Citation/Data Source	Website	U.S.	State	Most Current Data	Trend Data	Age	Race/Ethnicity	What Race/Ethnicity
Oral Health		Wall, T.P., & Lazar, V. (2000).	wada.org/prof/resources/pub	Yes	No	Yes (1988-1994)	(1971-74 & 1988-94)	Yes (2-5, 6-11, 12-18; 6-18)	No	(NA)
Oral Health	Low-Income Children only	G.M., Ko, G., & Ormond, B.A. (2000). Gaps in	federalism.urban.org/pdf/b15.pdf	Yes	Yes	Yes (1997)	No	Yes (3-5, 6-12, 13-17)	Yes (3-17)	WNH, BNH, ONH, H
Oral Health	Dental Decay	National Center for Chronic Disease Prevention and Health	www.cdc.gov/OraHealth/topics/ataglance2001.htm	Yes	No	Yes (1988-1994)	No	Yes (5-17, by one year increments)	No	(NA)
Oral Health	Decay	Vargas, C.M., Crall, J.J., & Schneider, D.A. (1998).	wada.org/prof/resources/pubs/index.asp	Yes	No	Yes (1988-1994)	No	Yes (2-5, 6-12)	Yes (2-5, 6-12)	WNH, BNH, Mexican American
Oral Health	Dental Carries	Department of Health and Human Services. (2000). Oral	www.surgeongeneral.gov/library/oralhealth/	Yes	No	Yes (1996)	No	Yes (5-17)	No	(NA)
Oral Health	Untreated tooth decay (Percentage that have)	U.S. Department of Health and Human Services. (2000). Oral	www.surgeongeneral.gov/library/oralhealth/	Yes	No	Yes (1996)	No	Yes (5-17)	Yes (2-9)	WNH, BNH, Mexican American
Oral Health	Untreated Dental Carries	Pastor, P.N., Makuc, D.M., Reuben, C., & Xia, H. (2002).	www.cdc.gov/nchs/data/ahus/ahus02cht.pdf	Yes	No	Yes (1988-94)	Yes (1971-74, 1982-84, 1988-1994)	Yes (2-5, 6-17, 10-19)	Yes (2-5, 6-17, 10-19)	WNH, BNH, Mexican American
Oral Health	tooth decay (at least one untreated decayed	Department of Health and Human Services. (2000). Oral	www.surgeongeneral.gov/library/oralhealth/	Yes	No	Yes (1996)	No	Yes (2-9, 5-17, 18+)	No	(NA)

VIII. ACKNOWLEDGMENTS

**Texas Department of State Health Services
Division of Family & Community Health Services
Family Health Research & Program Development Unit**

Brian C. Castrucci, MA, Director I

M. Aaron Sayegh, PhD, MPH, Research Specialist **(Principal Author)**

Kim Petrilli, MSPH, MSW, Program Specialist

Case Management and Screening Unit

Margaret Bruch, LCSW, Manager

Maria Vega, MPA, Texas Health Steps Branch Manager

Linda Altenhoff, DDS, State Dental Director, Oral Health Program

CDC Division of Oral Health Advisors

Jessamyn Ressler-Maerlender, MPH

Laurie K. Barker, MSPH

Linda S. Orgain, MPH

Scott M. Presson, DDS, MPH

DSHS OHP acknowledges the funding and technical support received from the Division of Oral Health at the Centers for Disease Control and Prevention, Atlanta, Georgia, in making this document available to the citizens of Texas as provided through Cooperative Agreement No. U58/CCU622789-02.



Department of State Health Services
Oral Health Program
1100 West 49th Street
Austin, Texas 78756
512-458-7323

www.dshs.state.tx.us/dental/default.shtm